A COMPUTER SIMULATION FOR THE EVALUATION OF ARTILLERY DIRECT FIRE SUPPORT SYSTEMS

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THESIS

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A Computer Simulation for the Evaluation of Artillery Direct Fire Support Systems

by

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ABSTRACT

A probablistic event store computer simulation of the artillery direct fire support system at brigade level is presented. The purpose of the model is to serve as a tool in evaluating changes in artillery fire support system effectiveness as system and battlefield parameters are varied. Parameters which are variable in the model pertain to the geometric configuration of the battlefield, artillery weapon employment configurations, artillery weapon ballistic parameters, weapon lethality, target configuration and vulnerability, artillery system time parameters, weapon position accuracy parameters, and target location accuracy parameters. A description of the model and a FORTRAN IV program listing are provided.

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I. INTRODUCTION

Current doctrine holds that the mission of the Army Field Artillery is

"...to provide continuous and timely fire support to the force commander by destroying or neutralizing those targets that jeopardize the accomplishment of his mission".

In order to accomplish its mission the field artillery is required to support the maneuver forces with timely, close, and accurate fires on hostile maneuver elements, deliver counterbattery fires throughout its zone of responsibility, and add depth to combat by delivering fires on hostile logistical installations, reserves, etc..

In combat the field artillery operates as an integral part of the overall fire support system. Within the fire support system all fire support means are coordinated and integrated so that hostile targets are adequately attacked by appropriate means or available weapons. The field artillery fire support system thus operates as a subsystem of the larger overall force fire support system.

The field artillery fire support system can be viewed as consisting of three basic subsystems each with basic functions as described below.

(1) Weapon Subsystem: This subsystem consists of the actual artillery weapons, personnel, and auxiliary equipment. The function of the weapon subsystem is to prepare and fire projectiles in accordance with specific fire commands provided it.

(2) Target Acquisition Subsystem: This subsystem in its simplest form consists of a forward observer team. In more advanced systems this forward observer may be augmented by aerial observers, aerial reconnaissance, and radar. The function of the target acquisition subsystem is twofold. This subsystem has the responsibility for locating and identifying suitable targets for artillery fire. Secondly, in the case of the forward observer, the effects of artillery fire on the hostile targets are observed. Adjustments are made to the impact points in order to achieve the best possible results.

(3) Command and Control Subsystem: The command and control subsystem consists of all elements necessary to coordinate and direct the actions of the other two subsystems. The function of this subsystem is basically to provide the necessary coordination and direction necessary for the proper utilization of these systems. The artillery fire support system command and control system is closely associated with the command and control system of the supported force.

The effectiveness with which an artillery fire support system accomplishes its mission must by definition be evaluated in terms of speed, accuracy, and damage or casualty producing effect that the artillery fire support system achieves against hostile targets in specific situations.

The effectiveness with which the overall system operates is a function of the effectiveness of the component subsystems. In each

of these subsystems, errors are introduced and time is consumed during the fire support process. In conducting a quantitative analytical evaluation of a specific system, one quickly encounters formidable mathematical obstacles. Broad generalizations are sometimes achievable; however, these seldom are of much operational value. Some typical questions which might be asked concerning a fire support system and for which a quantitative answer might be useful are:

(1) Suppose weapon System A is replaced by weapon system B which has greater lethality. What increases in kill rate can be anticipated?

(2) Suppose the current weapon employment configurations are modified. Will this modification yield any appreciable change in kill rate or some other suitably chosen measure of effectiveness?

(3) How is some suitably chosen measure of effectiveness related to width of the battle front, or movement rate of the supported force?

Questions such as those posed above can be extremely basic and important questions when artillery fire support system modifications are being considered or evaluated.

The purpose of this paper is to present a computer simulation model which may be of some assistance in answering questions such as those posed above. As a means of limiting the scope, the brigade level artillery fire support system was selected for modelling. The brigade is assumed to be conducting offensive operations.

II. THE BRIGADE LEVEL ARTILLERY FIRE SUPPORT SYSTEM

At maneuver brigade level artillery fire support is normally provided by an artillery battalion consisting of three firing batteries. This section describes the brigade level artillery fire support system in terms of the basic subsystems identified in Section I.

A. WEAPONS SUBSYSTEM

The weapons subsystem normally consists of three firing batteries each conventionally with six artillery weapons. The weapons are employed in battery size elements. The batteries are located in the offense behind the front line a distance approximately equal to 1/3 the maximum range of the weapon. The units are located laterally as the situation dictates in such a manner as to provide the best possible coverage for the entire brigade front.

B. TARGET ACQUISITION SUBSYSTEM

At brigade level the target acquisition system normally consists of the forward observer sections, the battalion liaison officers, and the battalion countermortar section when available.

Each of the committed maneuver companies in the brigade is provided an artillery forward observer. The mission of the forward observer is threefold. First, the forward observer provides advice and recommendations concerning the use of artillery to the company commander. Secondly, the forward observer serves as a fire support

assistant to the company commander. Thirdly, the forward observer adjusts the artillery when necessary to increase the effectiveness of the fire. The forward observer, being located with the maneuver element company commander, maintains an awareness for the availability of suitable targets for artillery fire.

An artillery liaison officer is provided each of the maneuver battalions in the brigade. The LNO serves as the fire support coordinator for the maneuver battalion. In this capacity, the LNO also maintains a current awareness of the availability of suitable targets for artillery. The LNO maintains his duty station in the battalion operations center and thus is constantly aware of the current intelligence and operational situations.

C. COMMAND AND CONTROL SUBSYSTEMS

The command and control subsystem consists of a Fire Direction Center and a Fire Support Coordination Center. The functions of each of these centers is described below.

1. Fire Support Coordination Center

The Fire Support Coordination Center is collocated with the brigade operations center and serves as the focal point for the coordination of all supporting fires delivered on surface targets. The goal of proper fire support coordination is the complete coordinated integration of all fire support means in an effort to ensure that each target is attacked in the most efficient manner.

The commander of the artillery battalion has responsibility for fire support coordination for the brigade; he thus has responsibility

for the operation of the brigade Fire Support Coordination Center. His representative at the FSC is the artillery battalion liaison officer.

2. Fire Direction Center

The Fire Direction Center (FDC) is that element which exercises tactical and technical fire direction of the battalion. Tactical fire direction consists primarily of selecting unit position areas and selecting the method of attack for targets being engaged. Technical fire direction, on the other hand, consists of the conversion of target location information and the results of the tactical fire direction decisions into suitable firing data for the weapons.

The coordination and integration of the fire support means are carried out in these two centers.

D. THE FIREPLANNING PROCESS

In order to properly coordinate fire support, it is necessary that the need for fire support be anticipated when possible. The artillery fireplanning process is the process whereby the need for artillery is anticipated and the use of available resources is planned. Artillery fireplanning is a continuing process and is conducted at all levels concurrently.

At the lowest level, the forward observer prepares target lists and forwards them to the liaison officer at maneuver battalion. The LNO consolidates the lists and coordinates them where necessary, then forwards them to the artillery fire direction center. The

artillery battalion S3, in the FDC, receives the target lists and other requests for fire and coordinates the allocation of the available artillery resources to satisfy the various requirements for artillery fire.

E. TYPES OF TARGETS

Two basic classification systems are used for artillery targets. Targets are first classified according to the characteristics of the target itself. Under this system the target can be classified as either personnel, material, or a piece of terrain which warrants engagement by fire.

Secondly, targets are classified as either being planned or unplanned. A planned target is a target which appears on one of the target lists described in the previous paragraph. A target of opportunity, or unplanned target, is a target which is observed or detected after an operation begins. Such a target has not been previously considered, analyzed, or planned and fire is frequently required immediately.

The planned targets can be further subcategorized into scheduled and on-call targets. The distinction between the two is clear from the following definitions:

(1) Scheduled Target. A target upon which fire is to be delivered at a specific time during an operation.

(2) On-Call Target. A planned target, other than a scheduled target, for which a need is anticipated but which will be fired on request rather than at a specific time.

F. OFFENSIVE SUPPORTING FIRE

When participating in the fireplanning process, those conducting fireplanning are guided by basic supporting fire requirements. There are three basic supporting fire requirements, namely: offense, defense, and a combination of the two. Since this model portrays the brigade in the offense, only the offense support requirements are considered.

Supporting fire, in general, is fire delivered by supporting units to assist a unit engaged in combat. When the supported unit is engaged in the offense, fires are planned to engage targets before the preparation phase, during the preparation phase, and during the attack. These different types of fires are each briefly described below:

1. Fires Before the Preparation Phase

Fires fired before a preparation phase normally consist of fire to cover the deployment and movement of troops, registration fire, and harrassing and and interdiction fire to restrict the enemy's movement and disrupt his command and control.

2. Fires During the Preparation Phase

Preparation fire is intense prearranged fire delivered in accordance with a time schedule to support an attack and is designed to disrupt the enemy's communications, to disorganize his defenses, and to neutralize his fire support means. Preparation fire starts before, at, or after H-hour and continues until it is lifted, either on a prearranged time schedule or on request of the assault elements.

3. Fires During the Attack

Fires during the attack are those fires delivered to assist the advance of the supported unit. They consist of fires between the line of departure and the objective, fires on the objective, and fires beyond the objective.

Targets generated in the fireplanning process generally include confirmed enemy locations, suspect enemy locations, likely enemy locations, and also prominent terrain features.

III. THE COMPUTER SIMULATION MODEL

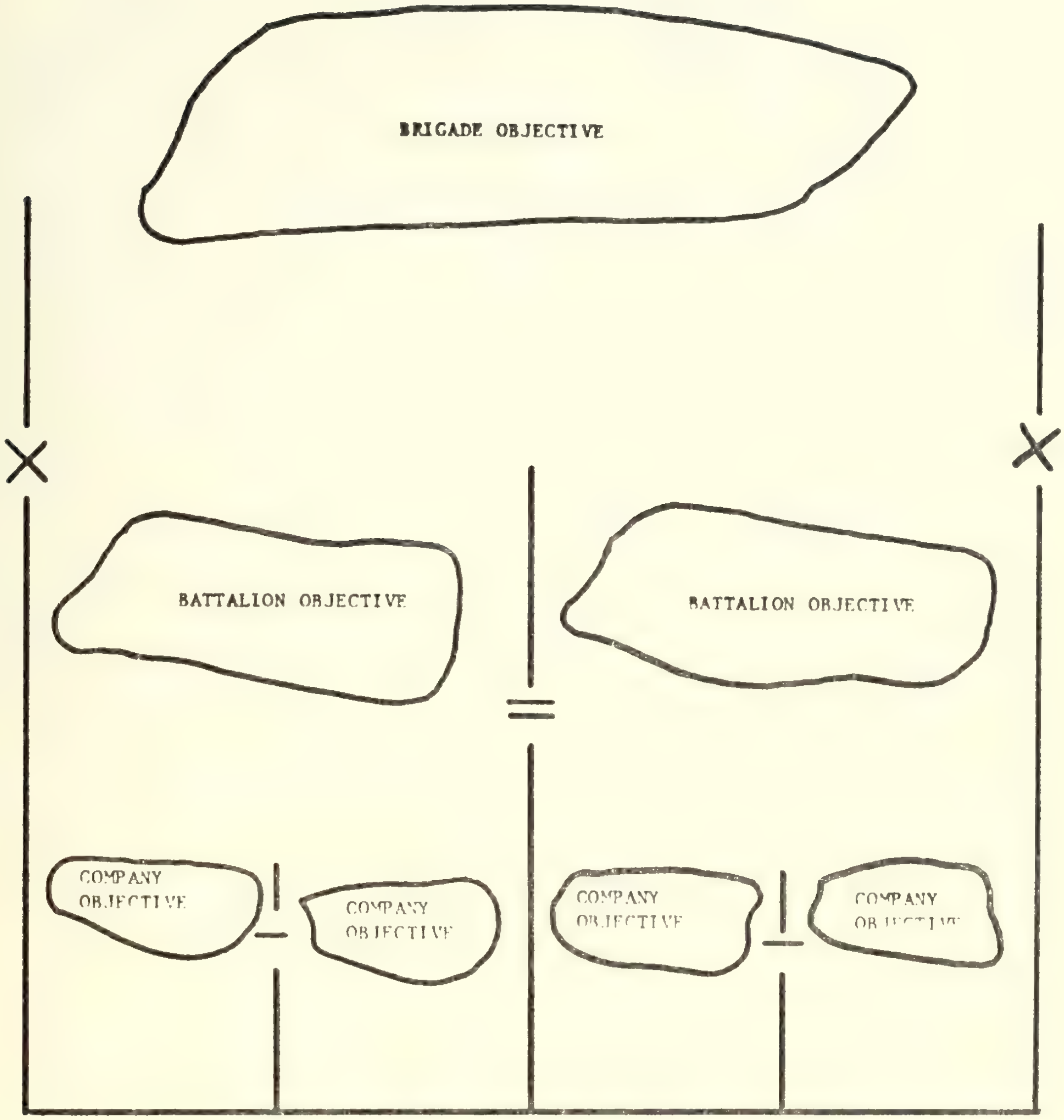
The computer simulation model is a computer representation of a brigade level offensive combat operation. Portrayed in the model are a maneuver brigade supported by a direct support artillery battalion. This section provides a description of the model.

A. SCENARIO

The battle area for the model is defined by the brigade left and right boundaries, the brigade rear area, and the brigade objective. The brigade area of responsibility is subdivided into two battalion areas of responsibility which are themselves each subdivided into two company areas of responsibility. The model thus portrays a brigade operating with a four company front. The brigade battle area is illustrated in Figure 1.

The brigade is supported by a direct support artillery battalion consisting of three batteries of six weapons each. In addition to the direct support battalion, it is assumed that additional artillery battalions are available which are capable of augmenting the fires of the direct support battalion where necessary. These additional supporting battalions play no direct role in the simulation; however, their existence is necessary to assure an orderly progression during the computer simulation.

The terrain is assumed to be flat and weather is considered to be conducive to unobstructed operations. Effects of changes in terrain and weather are not considered in the simulation.



X - Brigade Lateral Boundaries
II - Battalion Lateral Boundaries
I - Company Lateral Boundaries

THE BATTLE AREA

FIGURE 1

There is no friendly attrition or resupply played during the course of the simulation. Units are considered to be free of any logistical constraints. In this regard, it is assumed that sufficient maneuver element personnel replacements exist to sustain the offensive once the attack begins. It is also the case that artillery units have sufficient ammunition immediately available to carry out any and all fire missions as the requirements for fire are generated.

The initial phase of the simulation is a setup phase during which the initial situation is stochastically generated. Force objectives are described for each maneuver unit as are the unit lateral boundaries. Unit objectives are described by stochastically determining four basic objective characteristics for each objective, namely:

(1) distance from the front line to the objective
(2) length of the major axis
(3) length of the minor axis
(4) objective attitude

Using these four characteristics, an objective for each unit is defined and positioned. Figure 2 illustrates the characteristics of the objective.

After the unit objectives and lateral boundaries are specified and initial artillery fire plan is generated, the artillery batteries are positioned to support the fire plan. The battle is initiated by the firing of an artillery preparation in support of the attack on the unit initial objectives if one is called for by the fire plan.

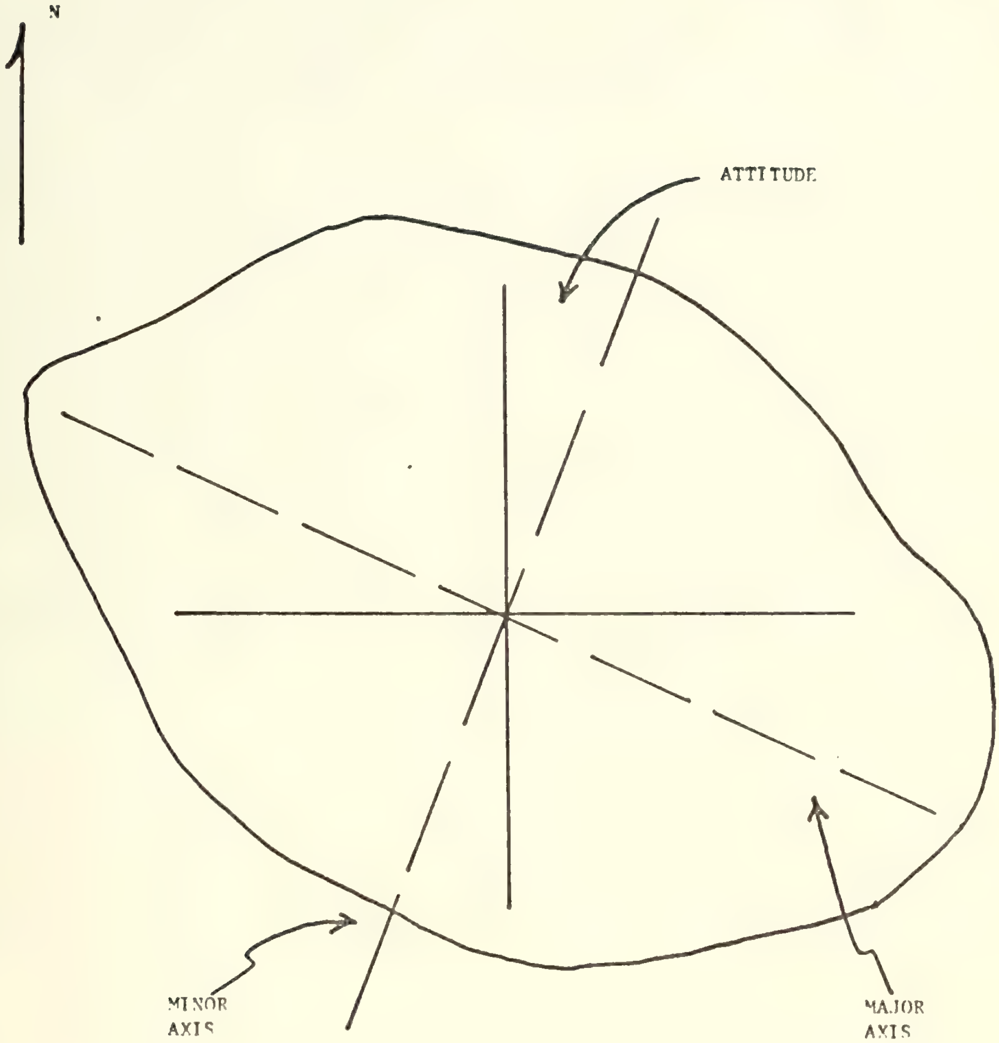


DIAGRAM OF A UNIT OBJECTIVE

FIGURE 2

The enemy force is simulated by randomly introducing targets upon which artillery fire is required. Targets are independent of one another and no starting enemy force disposition is assumed.

B. CONTROL AND MOVEMENT OF MANEUVER ELEMENTS

Control of the maneuver elements is affected by the assignment of subsequent unit objectives as the need arises and the use of control states and coordinated attack times for interunit coordination purposes. Unit locations are represented in the model geometrically by a single geometric point. This point is called the unit "Fire Planning Center (FPC)". A unit FPC corresponds to the geometric center of the dispositions of a unit's forward elements along the front line. Units are moved by moving the unit FPC.

1. Control States

Nine separate numbered control states for maneuver element control are used in the model. A description of each is as follows:

a. Control State 1

This state represents the planning state for the maneuver elements. While in this state fireplanning is conducted. Each unit is initially in this state and the state is re-entered each time a unit objective is secured. The simulated unit remains in this state until the pre-generated attack time for the next maneuver phase is reached.

b. Control State 2

State 2 represents the movement from the unit line of departure (LOD) to a transfer grid at which final closure onto the

objective may begin. The relative location of the transfer grid from the unit objective is a function of the distance from the line of departure for the unit to the objective center. The transfer point is prespecified as being located 2/3 of the distance between the line of departure and the unit objective center. When a unit crosses the transfer grid, it passes to state 3 for control.

c. Control State 3

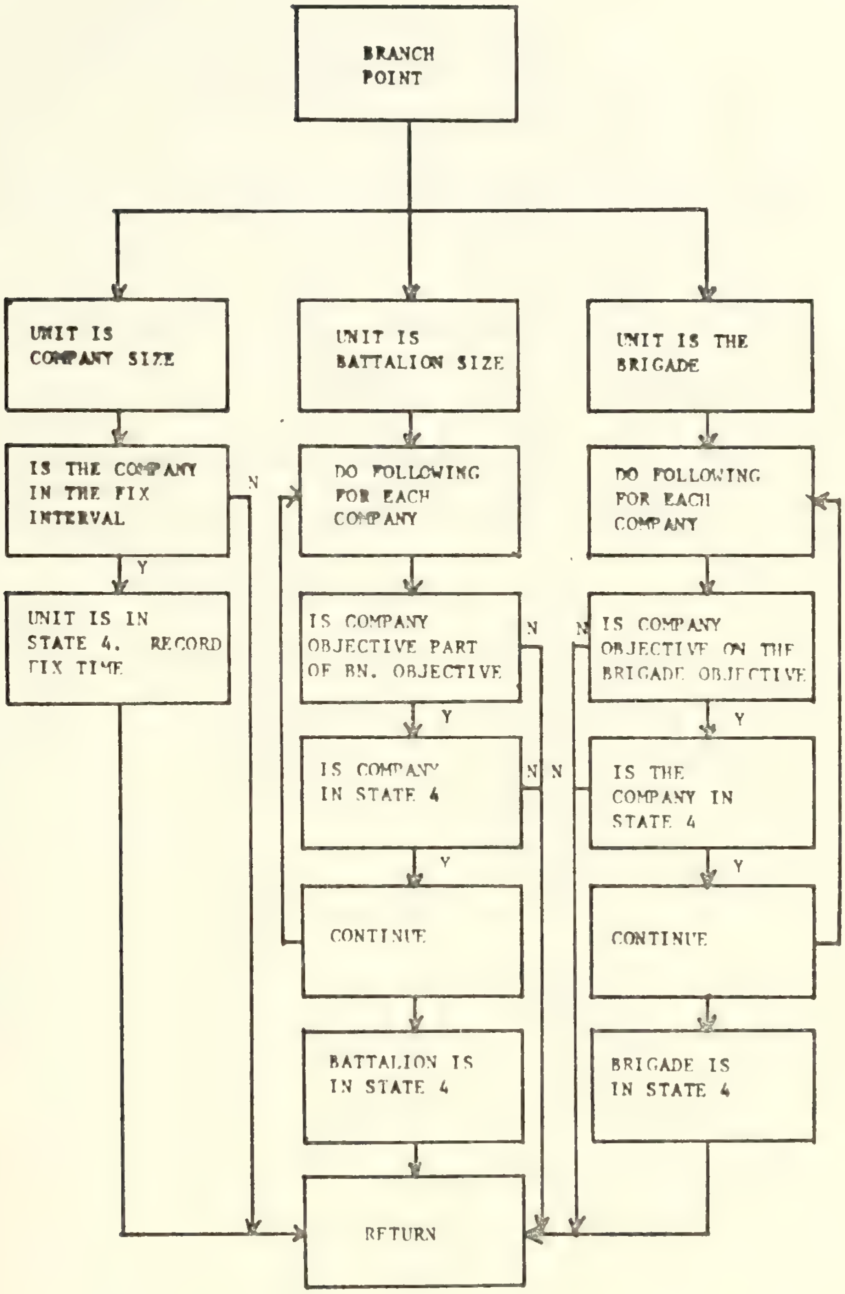
Closure onto the objective takes place while the unit is in control state 3. This state represents the unit movement from assault positions to the objective. While in state 3 the unit FPC is moved incrementally along a path leading directly to the objective center.

d. Control State 4

This state simulates the actions of the unit on and near the objective up until the time the objective becomes secure. A company size unit enters state 4 when it reaches a point less than 200 meters short of its objective center or a point on the far side of its objective center (indicating that the unit has fought through the objective). The logic controlling the assignment of state 4 to units larger than company is depicted in Figure 3.

e. Control State 5

A unit enters state 5 for control purposes when its objective has been secured and the unit objective is not located on the brigade objective. This state is intended to simulate the reorganization and control which takes place once an objective is


BRANCH POINT
UNIT IS COMPANY SIZE
UNIT IS BATTALION SIZE
UNIT IS THE BRIGADE
IS THE COMPANY IN THE FIX INTERVAL
N
Y
UNIT IS IN STATE 4. RECORD FIX TIME
DO FOLLOWING FOR EACH COMPANY
IS COMPANY OBJECTIVE PART OF BN. OBJECTIVE
N
Y
IS COMPANY IN STATE 4
N
Y
CONTINUE
BATTALION IS IN STATE 4
DO FOLLOWING FOR EACH COMPANY
IS COMPANY OBJECTIVE ON THE BRIGADE OBJECTIVE
N
Y
IS THE COMPANY IN STATE 4
N
Y
CONTINUE
BRIGADE IS IN STATE 4
RETURN

LOGIC FOR CONTROL STATE 4

FIGURE 3

secure. The program logic involved in the assignment of this control state is shown in Figure 4.

f. Control State 6

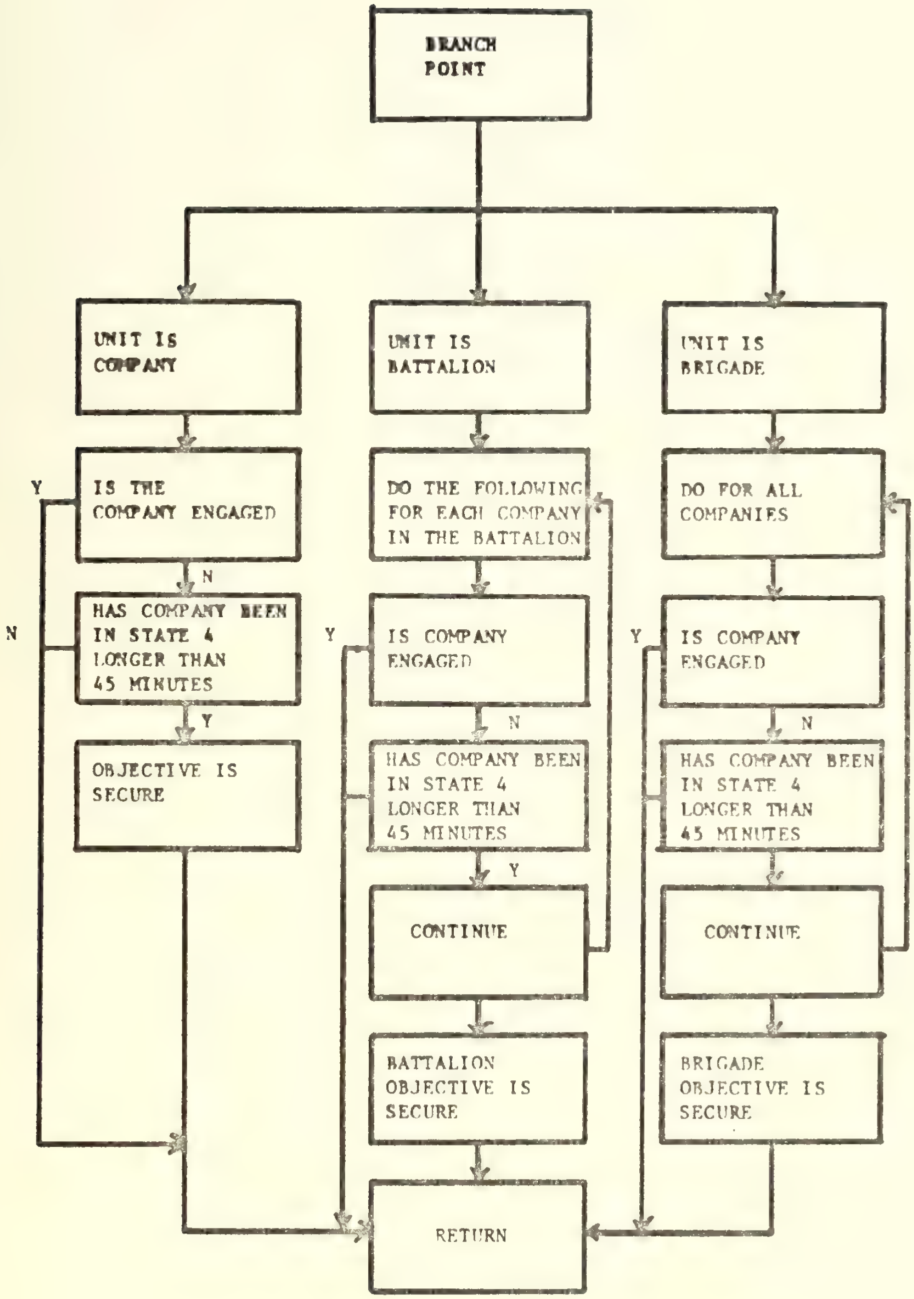
Control in this state pertains to freedom of movement. During the progression of the simulation, a unit FPC is never allowed to advance when it is ahead of its sister unit by more than a specified separation distance. The distance used is 1/5 the distance from the unit line of departure to the objective center. When a unit enters this state, movement becomes restricted. The algorithm controlling unit movement is shown in Figure 8.

g. Control States 7, 8, 9

Once a unit enters state 5, it becomes eligible for the assignment of a subsequent objective. The subsequent objective can be either independent of the next higher objective or can be a portion of this objective. The assignment rules for new objectives are illustrated in Figure 5 and Figure 6. A unit is placed in control state 7 if, when the new objective is generated, the objective is found to be independent of the next higher unit objective. Control state 8 is assigned if this is not the case. Control state 9 is assigned if the next objective is the unit's final objective for the simulation. The nine control states are interrelated as shown in Figure 7.

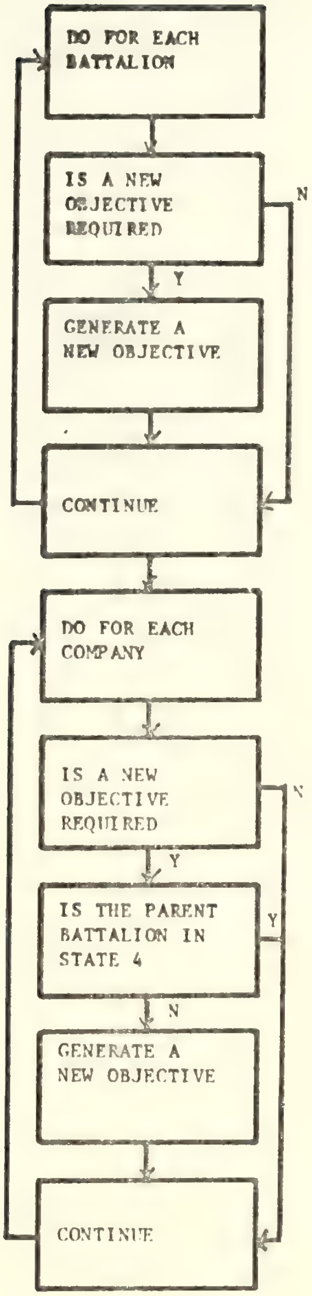
2. Attack Coordination

After a unit objective is secure and a new objective is assigned, a new attack time is established which coordinates the


BRANCH POINT
UNIT IS COMPANY
UNIT IS BATTALION
UNIT IS BRIGADE
IS THE COMPANY ENGAGED
Y
N
HAS COMPANY BEEN IN STATE 4 LONGER THAN 45 MINUTES
N
Y
OBJECTIVE IS SECURE
DO THE FOLLOWING FOR EACH COMPANY IN THE BATTALION
Y
IS COMPANY ENGAGED
N
HAS COMPANY BEEN IN STATE 4 LONGER THAN 45 MINUTES
Y
CONTINUE
BATTALION OBJECTIVE IS SECURE
DO FOR ALL COMPANIES
Y
IS COMPANY ENGAGED
N
HAS COMPANY BEEN IN STATE 4 LONGER THAN 45 MINUTES
CONTINUE
BRIGADE OBJECTIVE IS SECURE
RETURN

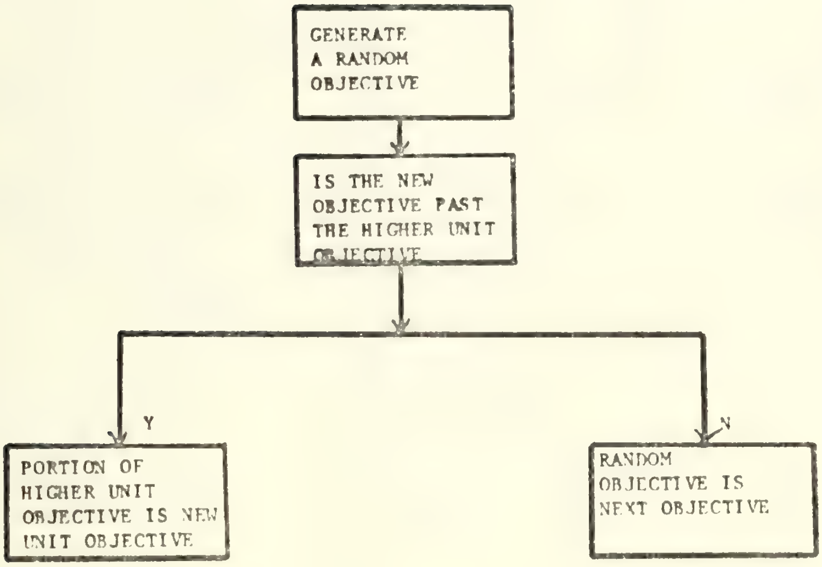
LOGIC FOR CONTROL STATE 5

FIGURE 4



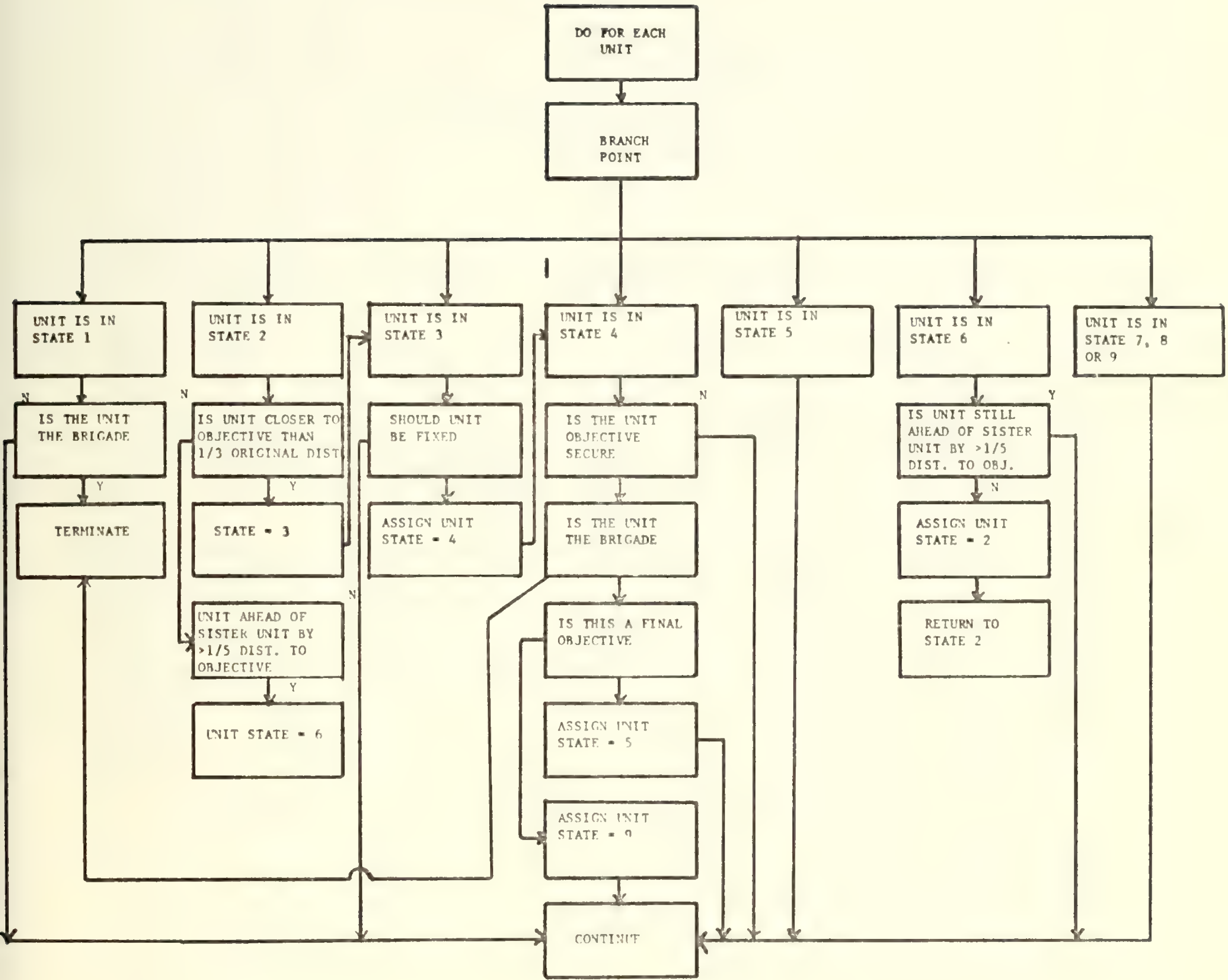
LOGIC FOR ASSIGNMENT OF NEW OBJECTIVES

FIGURE 5


GENERATE A RANDOM OBJECTIVE
IS THE NEW OBJECTIVE PAST THE HIGHER UNIT OBJECTIVE
Y
N
PORTION OF HIGHER UNIT OBJECTIVE IS NEW UNIT OBJECTIVE
RANDOM OBJECTIVE IS NEXT OBJECTIVE

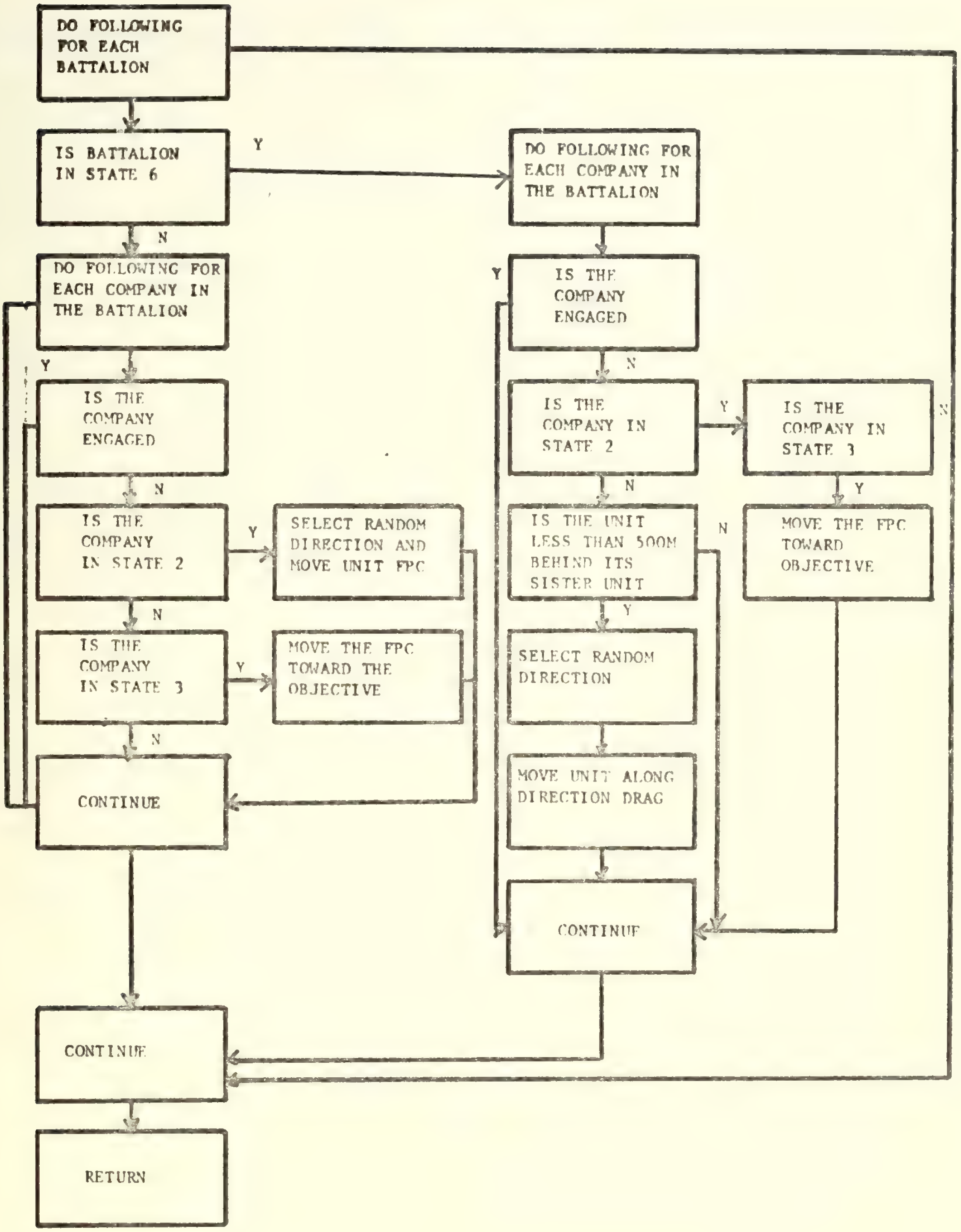
GENERATION OF NEW UNIT OBJECTIVE

FIGURE 6



INTERRELATIONSHIP OF THE CONTROL STATES

FIGURE 7


DO FOLLOWING FOR EACH BATTALION
IS BATTALION IN STATE 6
Y
N
DO FOLLOWING FOR EACH COMPANY IN THE BATTALION
Y
IS THE COMPANY ENGAGED
N
IS THE COMPANY IN STATE 2
Y
SELECT RANDOM DIRECTION AND MOVE UNIT FPC
N
IS THE COMPANY IN STATE 3
Y
MOVE THE FPC TOWARD THE OBJECTIVE
N
CONTINUE
DO FOLLOWING FOR EACH COMPANY IN THE BATTALION
Y
IS THE COMPANY ENGAGED
N
IS THE COMPANY IN STATE 2
Y
IS THE COMPANY IN STATE 3
N
Y
MOVE THE FPC TOWARD OBJECTIVE
N
IS THE UNIT LESS THAN 500M BEHIND ITS SISTER UNIT
N
Y
SELECT RANDOM DIRECTION
MOVE UNIT ALONG DIRECTION DRAG
CONTINUE
CONTINUE
RETURN

UNIT MOVEMENT LOGIC

FIGURE 8

unit movement with that of the remaining units. Two or more units are assigned identical attack times in the following situations:

a. Two companies of the same battalion have new objectives on the battalion objective.

b. Attack is initiated on a new battalion objective.

c. Both battalions have new objectives on the brigade objective.

In addition to having identical attack times assigned in the situations described above, fireplanning is coordinated as depicted in Figure 9.

3. Unit Movement

Company size units are moved by moving their respective fire planning centers. Movement of the battalions and the brigade is then reflected by the resulting displacement of their FPC's. Decision rules used to govern unit movement are shown in Figure 8.

4. The Update Sequence

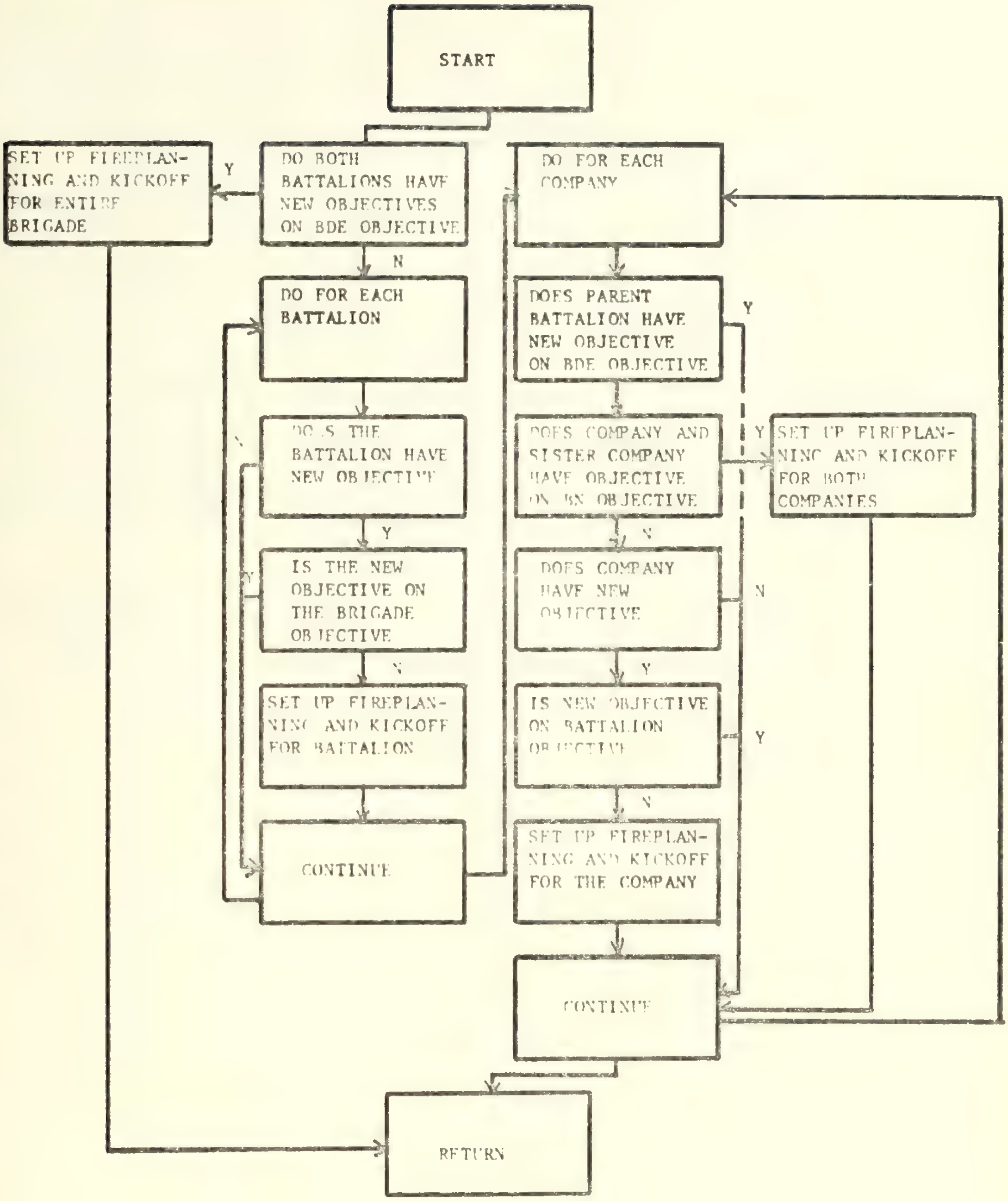
Every ten minutes and one second before generation of an artillery target of opportunity, the model goes through an update sequence. This sequence consists of four basic steps, namely:

a. Step 1

Unit fire planning centers are updated. This is accomplished as described in paragraph B,3 above.

b. Step 2

Unit control states are verified for each unit. It is during this step that changes in unit status are made.


START
DO BOTH BATTALIONS HAVE NEW OBJECTIVES ON BDE OBJECTIVE
Y
SET UP FIREPLANNING AND KICKOFF FOR ENTIRE BRIGADE
N
DO FOR EACH BATTALION
DOES THE BATTALION HAVE NEW OBJECTIVE
N
Y
IS THE NEW OBJECTIVE ON THE BRIGADE OBJECTIVE
Y
N
SET UP FIREPLANNING AND KICKOFF FOR BATTALION
CONTINUE
DO FOR EACH COMPANY
DOES PARENT BATTALION HAVE NEW OBJECTIVE ON BDE OBJECTIVE
Y
DOES COMPANY AND SISTER COMPANY HAVE OBJECTIVE ON BN OBJECTIVE
Y
SET UP FIREPLANNING AND KICKOFF FOR BOTH COMPANIES
N
DOES COMPANY HAVE NEW OBJECTIVE
N
Y
IS NEW OBJECTIVE ON BATTALION OBJECTIVE
Y
N
SET UP FIREPLANNING AND KICKOFF FOR THE COMPANY
CONTINUE
RETURN

FIREPLANNING AND ATTACK COORDINATION LOGIC

FIGURE 9

c. Step 3

New objectives are assigned if the need exists. This step is described in paragraph B,1 above.

d. Step 4

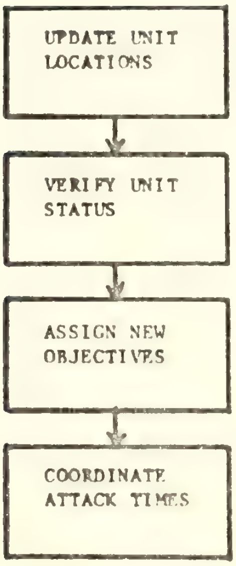
Unit attack times and fire planning are coordinated if a need exists for coordination.

The update sequence is controlled by Subroutine DECIS. The sequence is shown diagrammatically in Figure 10.

C. POSITIONING, MOVEMENT, AND CONTROL OF ARTILLERY UNITS AND WEAPONS

Initially, an artillery battery is positioned behind the geometric center of the front line of each of the maneuver battalions. The third battery is positioned in the center of the brigade area of responsibility. The exact location of each battery in northing and easting is a normal variate about the respective fireplanning centers of the maneuver elements involved.

The azimuth of fire of each battery is initially the angle from the battery center to the center of mass of all company level planned targets. In subsequent position areas, the azimuth of fire for each battery is computed in an analogous manner with the exception that the centers of mass used are the company planned target center of mass points for the appropriate battalions. The center battery in subsequent position areas is layed on the center of mass of company level planned targets for all companies. In the event that there are no company level planned targets at a particular time, a default azimuth of fire of 0000 mils is assigned.



THE UPDATE SEQUENCE

FIGURE 10

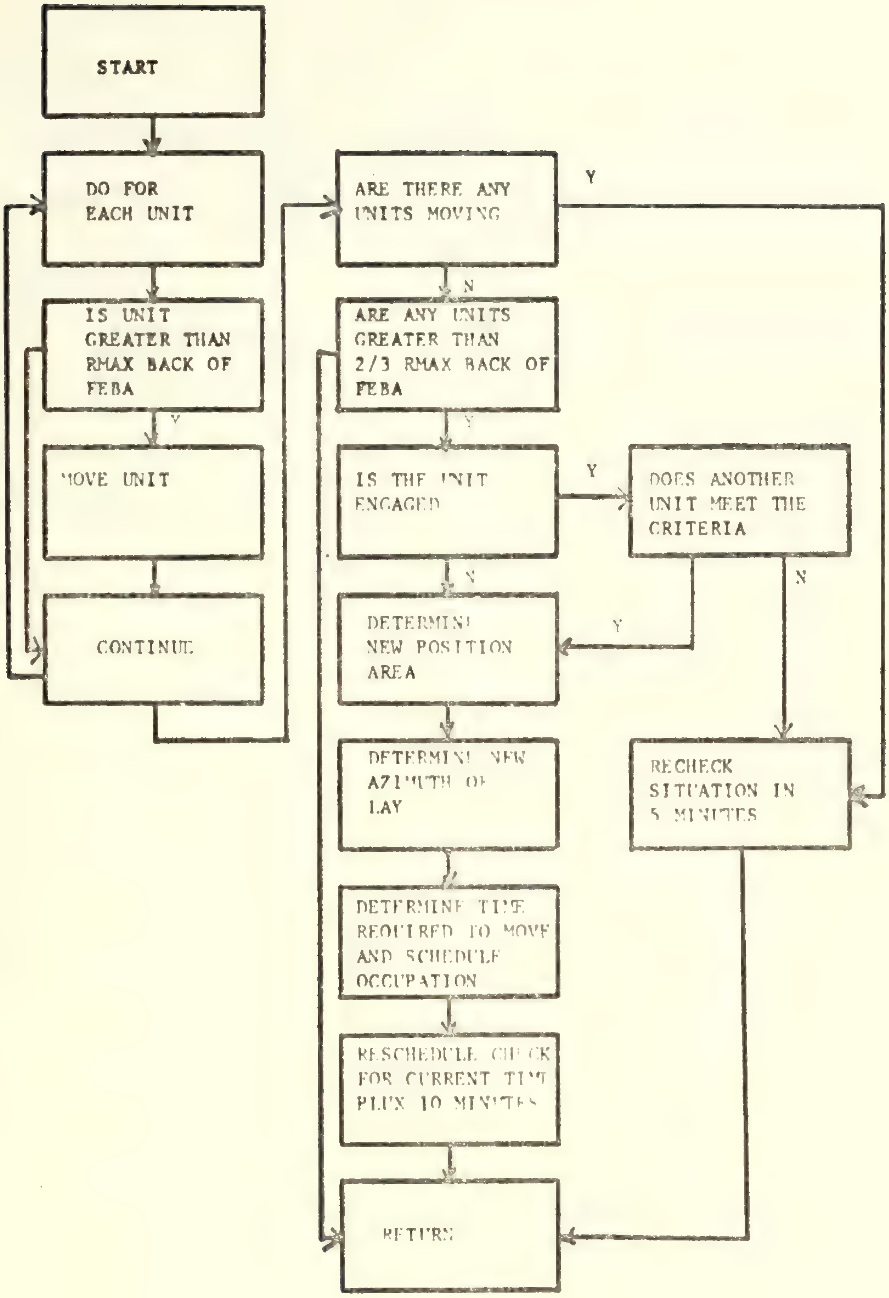
Each weapon in the battery is positioned with respect to the battery center based on input parameters. The parameters describe the bounds on the x and y coordinates of each weapon in a coordinate system with origin at the battery center and positive y axis aligned along the direction fo fire.

Each artillery battery position is validated as still being within supporting range every 10 minutes during the simulation. A battery is said to be in supporting range of the respective unit if the distance between the battery center and the appropriate FPC is less than 2/3 the maximum range. When some battery is greater than a distance of 2/3 maximum range, it is moved provided two conditions are satisfied. First, no unit can move while it is engaged in a fire mission. If the unit selected to move is engaged in a fire mission, the time for the move is delayed until the mission is completed. Secondly, only a single unit is permitted to move at any particular time. In the event that a unit is selected for movement but the movement is constrained, the decision cycle is halved from 10 to five minutes. The movement logic is shown in Figure 11.

Control of the artillery batteries is established using three states described as follows:

1. State 1

The unit is not engaged in a fire mission. The unit is free to move provided no other artillery units are moving.


START
DO FOR EACH UNIT
IS UNIT GREATER THAN RMAX BACK OF FEBA
Y
MOVE UNIT
CONTINUE
ARE THERE ANY UNITS MOVING
Y
N
ARE ANY UNITS GREATER THAN 2/3 RMAX BACK OF FEBA
Y
IS THE UNIT ENGAGED
Y
DOES ANOTHER UNIT MEET THE CRITERIA
N
N
Y
DETERMINE NEW POSITION AREA
DETERMINE NEW AZIMUTH OF LAY
RECHECK SITUATION IN 5 MINUTES
DETERMINE TIME REQUIRED TO MOVE AND SCHEDULE OCCUPATION
RESCHEDULE CHECK FOR CURRENT TIME PLUS 10 MINUTES
RETURN

ARTILLERY MOVEMENT LOGIC

FIGURE 11

2. State 2

The unit is actively engaged in a fire mission. Movement must be delayed until the fire mission is completed.

3. State 3

The unit is moving. While the unit is moving, it is not available for fire missions.

D. FIREPLANNING AND FIRE ALLOCATION

The types of planned targets simulated in the model are as follows:

1. Scheduled Target

A scheduled target is one for which a need can be anticipated for artillery fire. This type of target is engaged at some prespecified time without any additional request for fire.

2. On-Call Target

An on-call target is one for which a need for fire is anticipated; however, no precise engagement time can be prespecified.

3. Preparation Target

A preparatory target is one which will be engaged in support of the initial phase of the attack. All preparation type targets are engaged in accordance with a specified fire plan which is generated in the model.

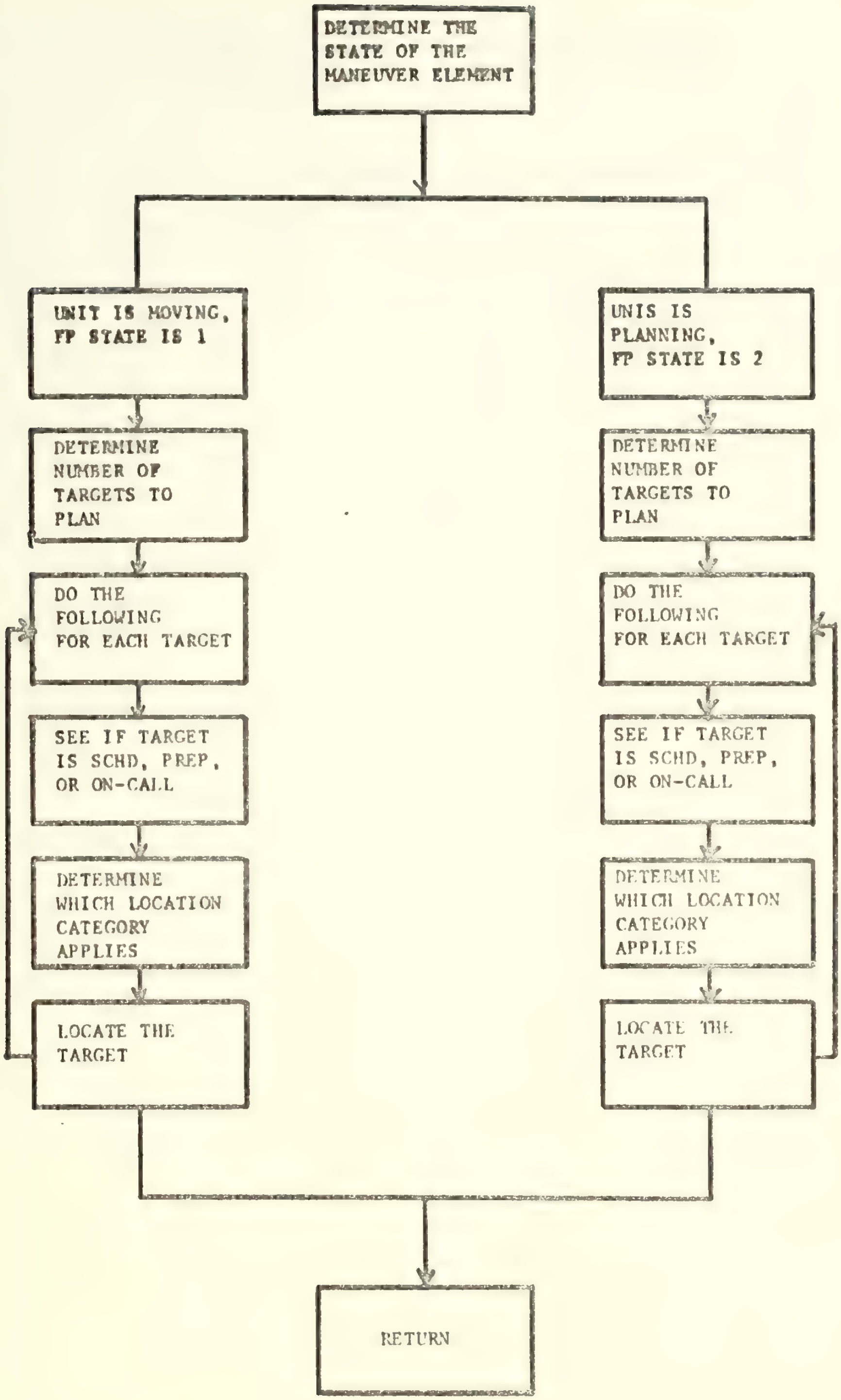
Planned targets are further categorized into three subcategories according to relative location. Targets are classified as lying between the lines of departure (or FEBA) and the objective, on the

objective, and beyond the objective. The probability that an arbitrary planned target falls in one of these location categories is conditioned on the actual fireplanning stage. The specific probabilities involved are a function of unit size and stage. For fireplanning purposes a maneuver element can be in one of two stages, stage 1 or stage 2. A specific unit is considered to be in stage 1 if it is in control state 1; otherwise it is considered to be in stage 2.

The number of targets which will be planned at a given time is a function of the fireplanning stage a unit is in when fireplanning takes place. In this model the total number of targets selected is a conditional discrete random variable. Actual target locations are determined in routines which are described in paragraph E. The fireplanning process is described diagrammatically in Figure 12.

Fire allocation consists of assigning responsibility for a specific target to a specific artillery unit. In this model, target responsibility is assigned to battery level. In the case of scheduled targets, one battery is assigned responsibility for all targets generated by a specific battalion. The center battery is assigned responsibility for the targets scheduled by the brigade. The time for fire is based on the distance between the brigade fireplanning center and the target and the brigade mean rate of advance which is an input parameter.

Preparatory targets are assigned to specific units based on range, time for attack, and an equitable distribution of responsibility. In


DETERMINE THE STATE OF THE MANEUVER ELEMENT
UNIT IS MOVING, FP STATE IS 1
UNIS IS PLANNING, FP STATE IS 2
DETERMINE NUMBER OF TARGETS TO PLAN
DETERMINE NUMBER OF TARGETS TO PLAN
DO THE FOLLOWING FOR EACH TARGET
DO THE FOLLOWING FOR EACH TARGET
SEE IF TARGET IS SCHD, PREP, OR ON-CALL
SEE IF TARGET IS SCHD, PREP, OR ON-CALL
DETERMINE WHICH LOCATION CATEGORY APPLIES
DETERMINE WHICH LOCATION CATEGORY APPLIES
LOCATE THE TARGET
LOCATE THE TARGET
RETURN

FIREPLANNING LOGIC

FIGURE 12

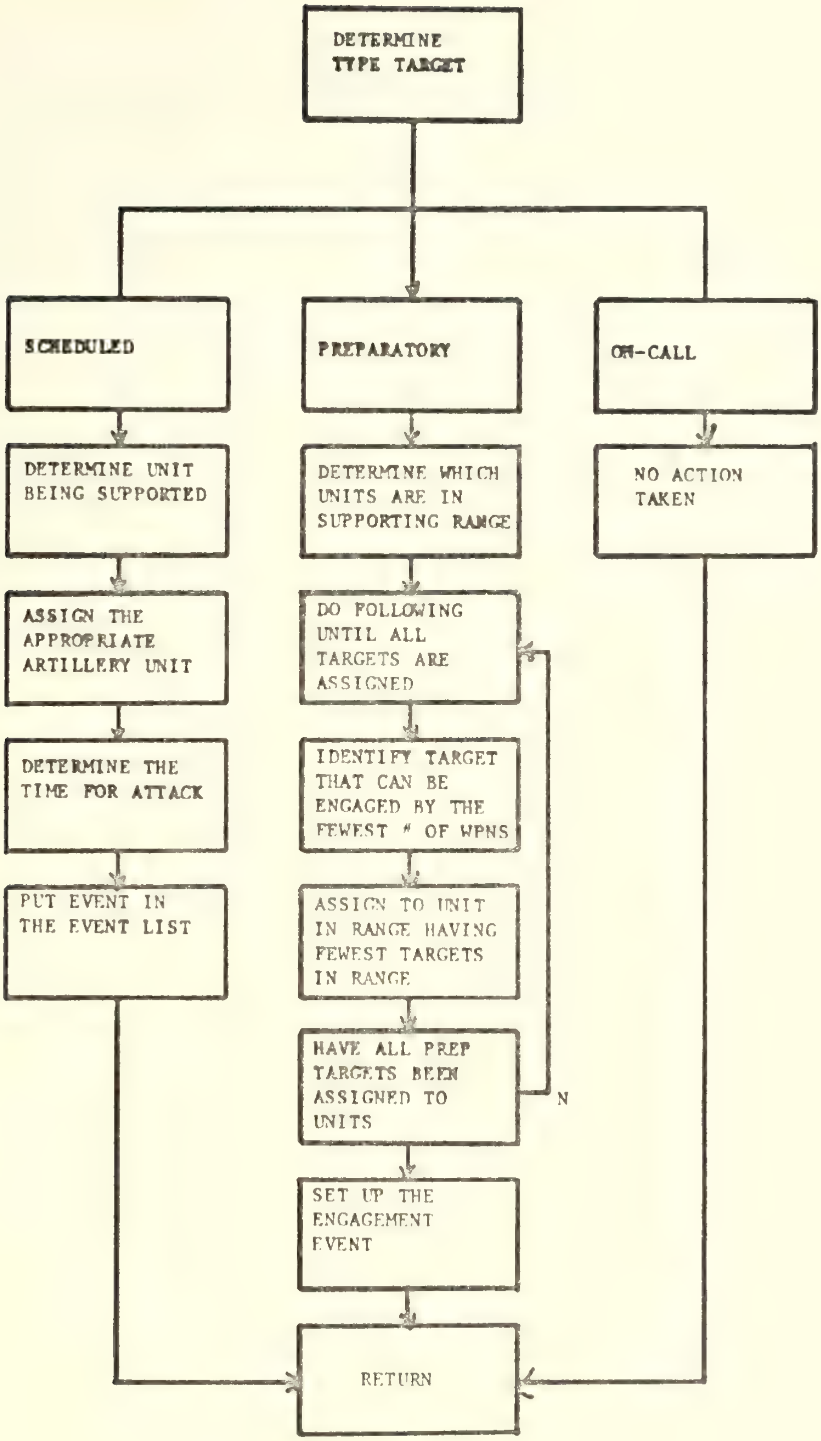
allocating the preparatory fires, the model determines the total number of units which are within range of each target first. Those targets which can be reached by the fewest number of units are then assigned to the unit which can engage the fewest number of targets. The time for attack is based upon the number of targets a specific unit must engage during the preparatory fire phase. The time increment used is two minutes per target. If, for example, a unit had three targets to engage, the first would be engaged at the attack hour (HHOUR) minus four minutes, the second at HHOUR minus two minutes, and the last at HHOUR.

E. LOCATION AND DESCRIPTION OF TARGETS

There are two separate target location routines in the model, one for planned targets and the other for unplanned targets. The scheduled targets are located based upon the general location category which applies. The categories and a brief discussion of the algorithms in each case are given below:

1. Planned Target

For the purposes of target location the term "planned target" applies to all targets which are not classified as targets of opportunity. Due to this distinction, all planned targets can be further categorized into one of three general location categories, namely: between the line of departure (or FEBA) and the objective, on the objective, and beyond the objective. The exact easting and northing coordinates of the target centers are considered to be


DETERMINE TYPE TARGET
SCHEDULED
PREPARATORY
ON-CALL
DETERMINE UNIT BEING SUPPORTED
DETERMINE WHICH UNITS ARE IN SUPPORTING RANGE
NO ACTION TAKEN
ASSIGN THE APPROPRIATE ARTILLERY UNIT
DO FOLLOWING UNTIL ALL TARGETS ARE ASSIGNED
DETERMINE THE TIME FOR ATTACK
IDENTIFY TARGET THAT CAN BE ENGAGED BY THE FEWEST # OF WPNS
PUT EVENT IN THE EVENT LIST
ASSIGN TO UNIT IN RANGE HAVING FEWEST TARGETS IN RANGE
HAVE ALL PREP TARGETS BEEN ASSIGNED TO UNITS
N
SET UP THE ENGAGEMENT EVENT
RETURN

FIRE ALLOCATION

FIGURE 13

independent uniform variates. The bounds applicable for each category for a particular unit are as shown in Figure 14.

2. Target of Opportunity

A target of opportunity has associated with it one of the four maneuver companies. The location of a target of opportunity is related to the unit boundaries as shown in Figure 15. In this case the easting and northing coordinates are independent uniform variates. The edges of the box in Figure 15 define the endpoints of the appropriate intervals.

All targets in the model are assumed to be personnel targets. Two general size categories are available. The input parameters define the size parameters and the probability that a random target will belong to one of the two categories.

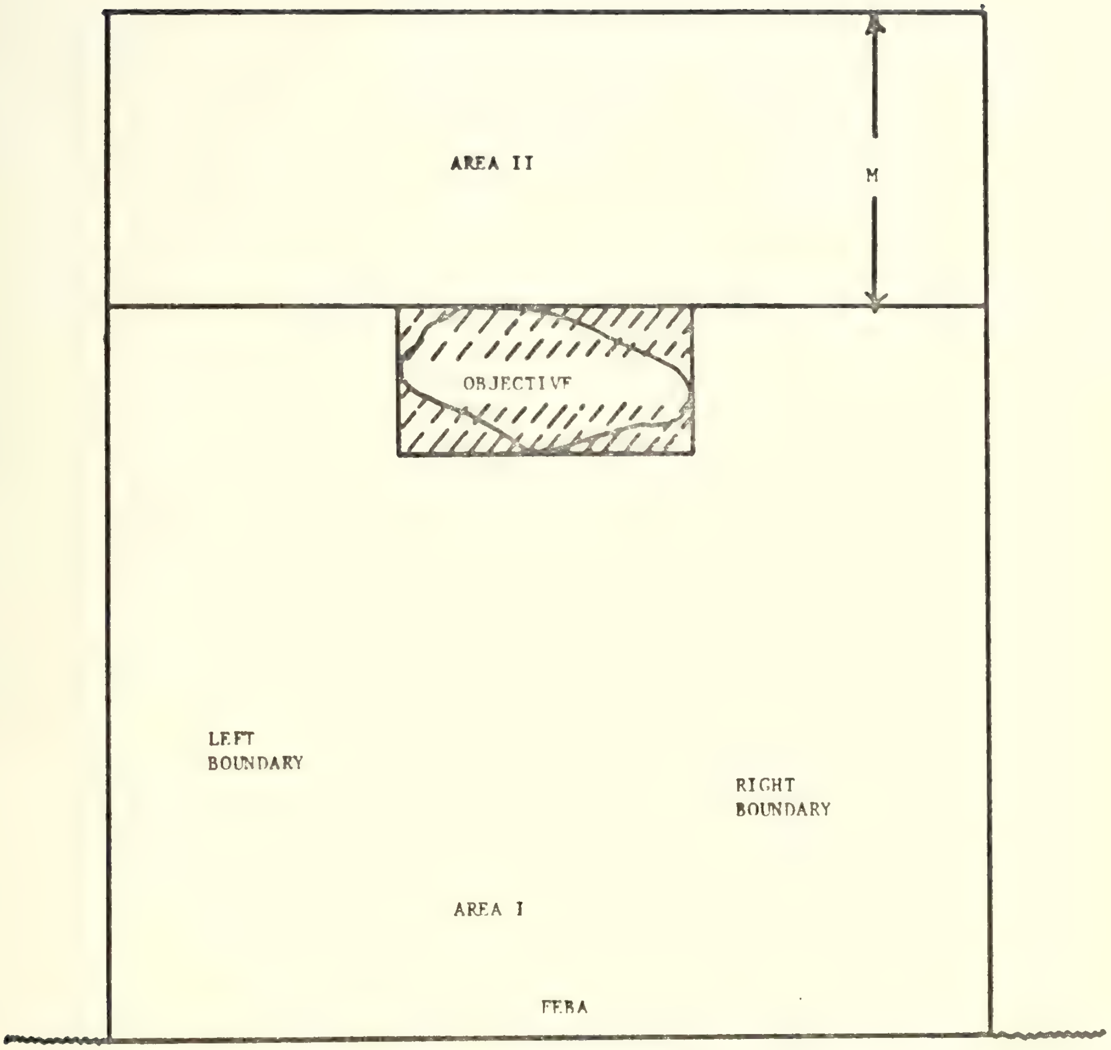
Targets in the model are portrayed by arranging a random number of target elements uniformly within a rectangular array. For purposes of target geometrical description, three zones are defined and identified as Zone 1, Zone 2, and Zone 3. The target-zone organization is shown in Figure 16. The zones have the following significance:

1. Zone 1

Zone 1 is that geographical area within which 50% of the target elements are located.

2. Zone 2

The geographical area within which 40% of the target elements lie.

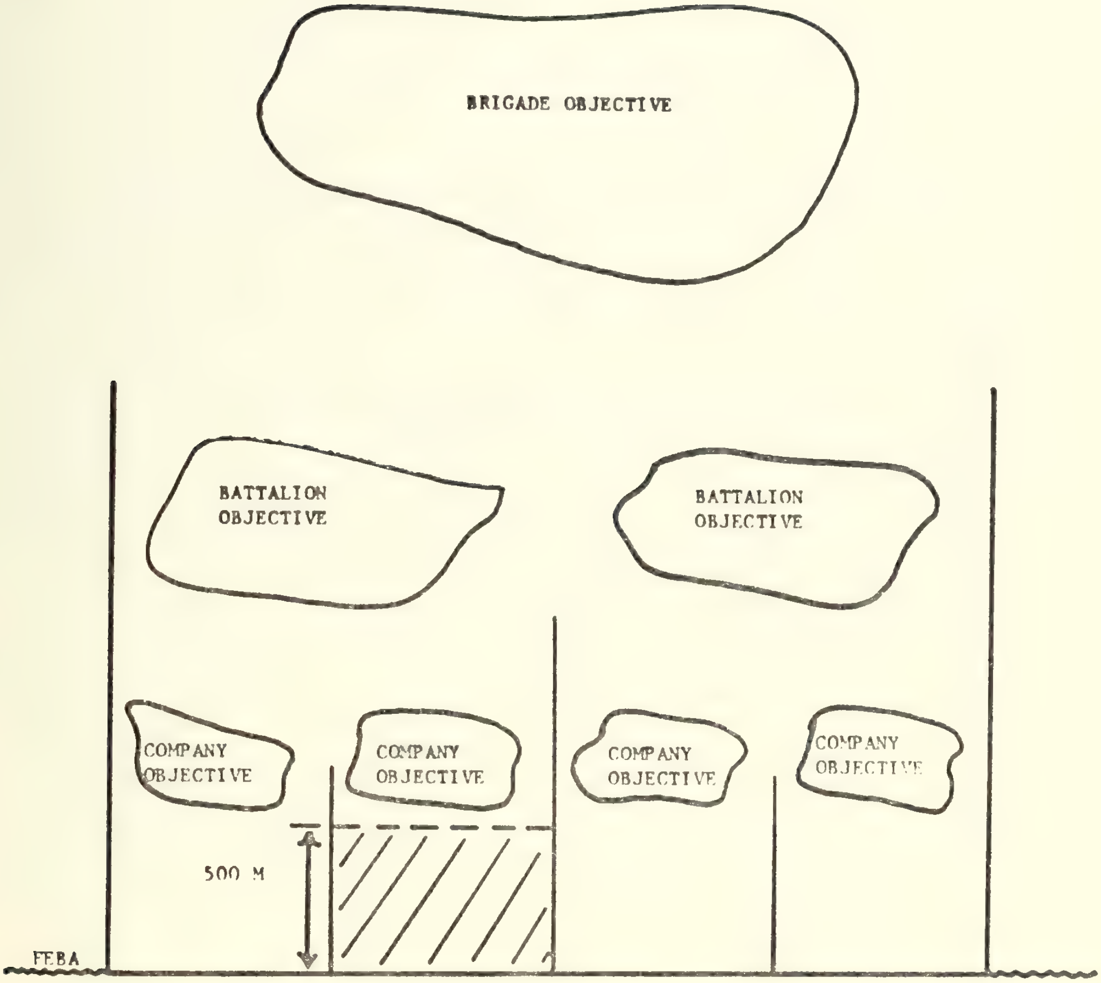


AREA I - BETWEEN LD (OR FEBA) AND OBJECTIVE
AREA II - BEYOND THE OBJECTIVE
////// - ON THE OBJECTIVE

$$M = \begin{cases} \text{1000 M - COMPANY} \\ \text{2000 M - BATTALION} \\ \text{3000 M - BRIGADE} \end{cases}$$

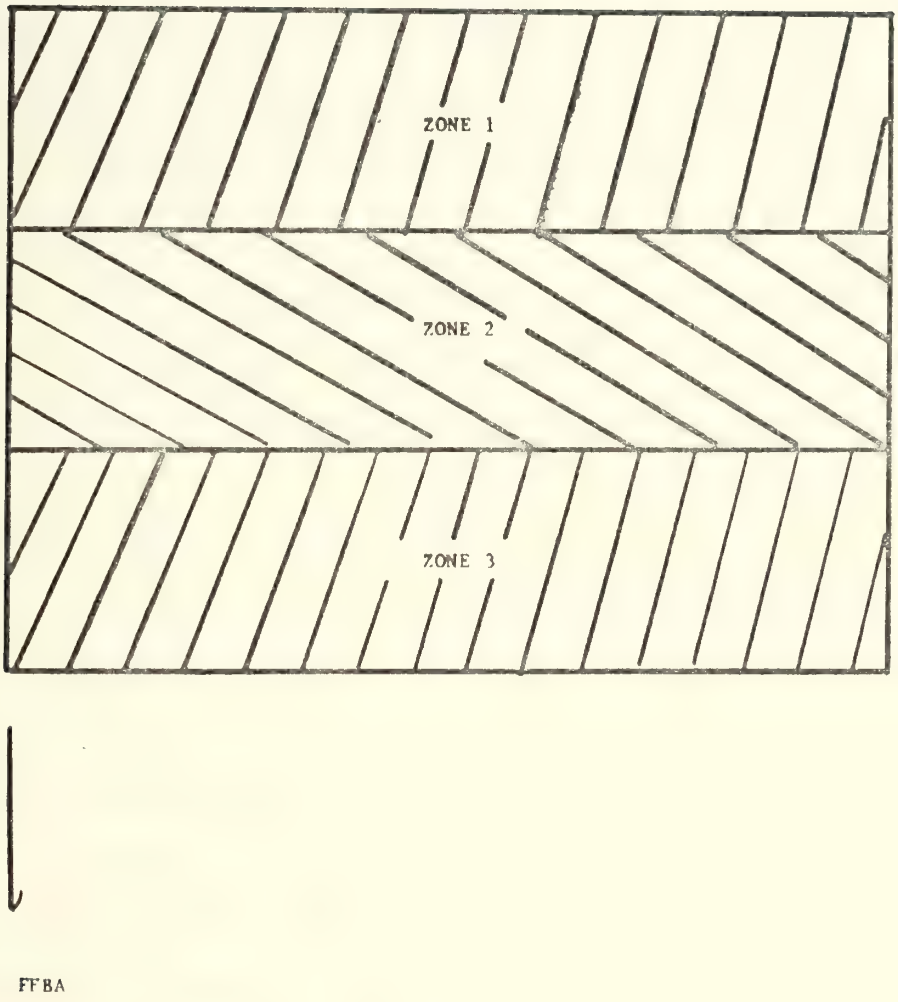
TARGET LOCATION CATEGORIES

FIGURE 14



TARGET LOCATION BOUNDARIES FOR TARGET OF OPPORTUNITY

FIGURE 15



TARGET-ZONE ORGANIZATION

FIGURE 16

3. Zone 3

That area within which the remaining 10% of the target elements are located.

Within each zone the exact location of a specified target element is described by easting and northing coordinates which are independent uniform variates having the respective zone boundaries as bounds.

The logic involved in describing a target is shown in Figure 17.

All targets are considered to be stationary and homogeneous. The lethality considerations involved are discussed in paragraph J below.

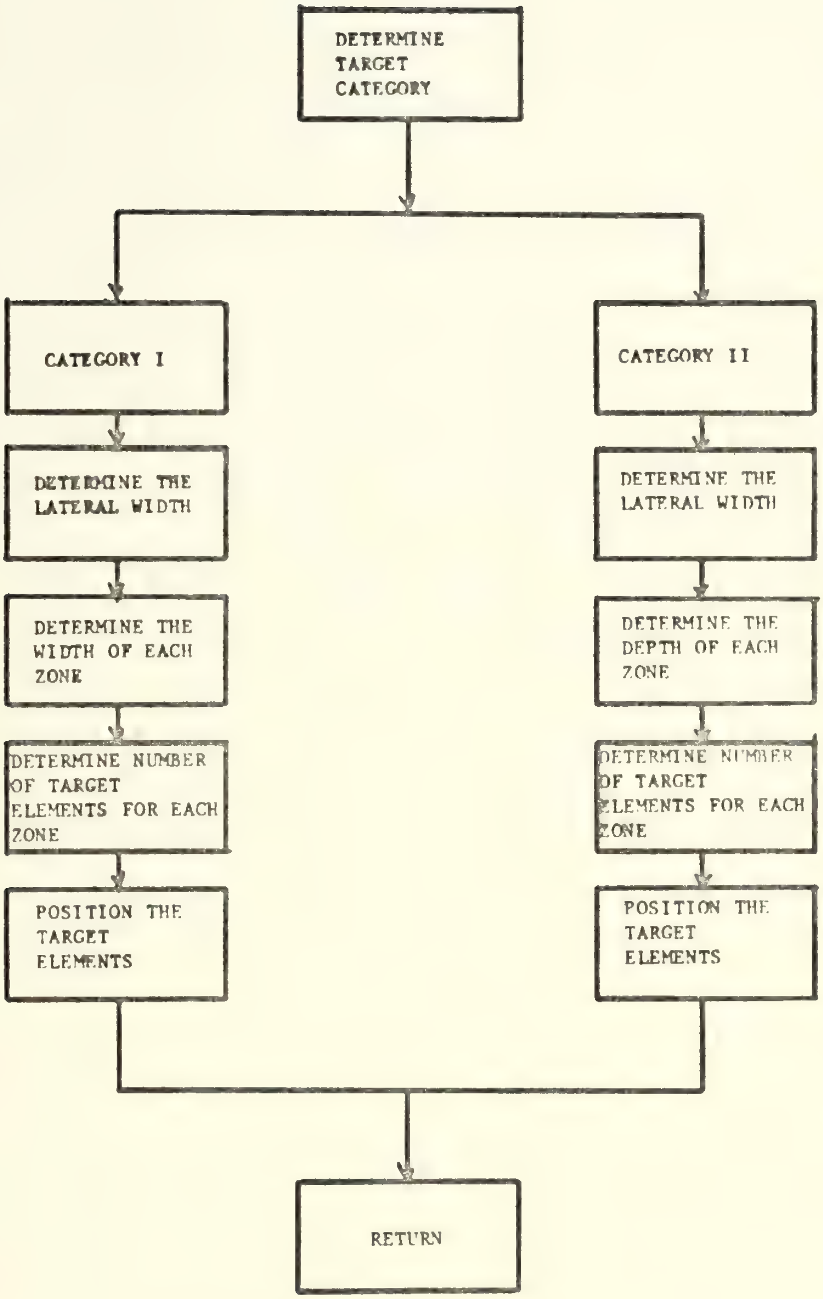
A preset probability of 0.3 is used in the model to determine if there is, in fact, a target located at the designated point in the case of planned targets. If it is determined that there is a target there, it is considered to fall into size Category II.

F. ERRORS IN THE FIRE SUPPORT SYSTEM

The errors simulated in the model can be categorized as firing errors and non-firing errors. The basic non-firing errors included are:

1. Artillery Unit Position Error

Artillery unit position error is defined as the deviation in easting and northing of the actual unit center from that which was assigned. The result of this error is felt in the firing process by virtue of the fact that the assigned location is that location from which the unit firing data are computed. The result is a constant error component in the total round error term. This error


DETERMINE TARGET CATEGORY
CATEGORY I
CATEGORY II
DETERMINE THE LATERAL WIDTH
DETERMINE THE LATERAL WIDTH
DETERMINE THE WIDTH OF EACH ZONE
DETERMINE THE DEPTH OF EACH ZONE
DETERMINE NUMBER OF TARGET ELEMENTS FOR EACH ZONE
DETERMINE NUMBER OF TARGET ELEMENTS FOR EACH ZONE
POSITION THE TARGET ELEMENTS
POSITION THE TARGET ELEMENTS
RETURN

TARGET DESCRIPTION LOGIC

FIGURE 17

is normally compensated for in the adjustment process. The two components of this error, deflection and range, are assumed to be independently distributed normal variates with mean, $\mu = 0$, and variance σ^2, input as a model parameter.

2. Target Location Error

Target location error is defined as the deviation of the actual target location from that reported by the forward observer. This error is applied when targets of opportunity are being engaged. In this case, the error is compensated for in the artillery adjustment process. If no adjustment takes place, the round impact point will have a constant error component equal to the target location error.

This error is assumed to be a function of the distance between the forward observer and the actual target. The error is expressed in the model as consisting of a distance component and a deflection component. These components are independently distributed normal variates with means equal 0 and variances given by the relationships:

$$V_{dist} = a + bx$$

$$V_{def} = c + dx$$

where

V_{dist} = Variance of the distribution of the distance component

V_{def} = Variance of the distribution of the deflection component

x = Distance between the forward observer and the target expressed in meters

"a", "b", "c", and "d" are input parameters to the model.

3. Burst Location Error

Burst location error is defined as the deviation between the actual burst location and the location sensed by the forward observer in the adjustment process. This error is also assumed to be expressible as independently distributed normal variates with distribution parameters defined in the same fashion as those for the target location error.

The only firing error simulated in the model is the terminal ballistic error. The basis for information concerning this error is "probable error" information tabulated experimentally and disseminated for use in the current weapon firing tables. The "probable error" in either range or deflection is defined as the distance within which 50% of the rounds should fall in either deflection or range as appropriate. This information is input to the model and internally converted to distribution variances. The range dispersion and the deflection dispersion are assumed to be independently distributed normal variates with mean equal 0 and variances a function of range and the probable errors as discussed above. Chebychev's inequality and application of the definition of probable error are used to convert a probable error into a distribution variance for some specific range.

Other ballistic firing errors such as internal ballistic errors and errors due to nonstandard meteorological conditions are not represented in the model.

G. TIME FACTORS IN THE FIRE SUPPORT SYSTEM

The time factors included in the model can be categorized as pertaining to the maneuver elements or to the artillery.

1. Time Factors for the Maneuver Elements

The maneuver element times considered were:

a. Movement Rate

The movement rate is assumed to be a uniform random variable measured in kilometers/hour. Each time a unit is required to move during the simulation, the movement rate to apply for the move is obtained by sampling from the distribution. The variation in the rate is assumed to compensate for variation in terrain, etc.. Different type units can be portrayed from a mobility point of view by proper selection of the movement rate.

b. Search and Seizure Time on the Objective

This factor is used to account for the time a unit requires once it reaches an objective to secure the objective. During the simulation a unit objective is not classified as secure until the unit has been on the objective for this specified period of time. The time increment used in the model is forty-five minutes and is fixed.

c. Reorganization and Consolidation Time

This time factor accounts for the time it takes a unit to plan, reorganize, and resupply itself once an objective has been secured. A unit is not allowed to continue the attack in the model until some random time after the unit has secured its objective.

This time increment is a uniformly distributed random variable. The distributions are dependent upon the unit size and situation as described below:

(1) Case I. Both battalions have as their new objectives portions of the brigade objective. In this case all companies conduct a coordinated attack. The time required to coordinate the attack is a uniform variate measured in seconds with lower and upper bounds of 2400 seconds and 4200 seconds respectively.

(2) Case II. One of the battalions is assigned a new objective not on the brigade objective. In this case, the planning time increment is a uniform variate measured in seconds with lower and upper bounds of 1800 seconds and 3600 seconds respectively.

(3) Case III. Both companies of a battalion have new objectives on their battalion objective where the battalion objective is not the brigade objective. In this case, the planning time increment is uniformly distributed with lower and upper bounds of 1800 seconds and 2400 seconds respectively.

(4) Case IV. A company has a new objective not a portion of the battalion objective and the present company objective is not on the battalion objective. The planning time is a uniform variate with lower and upper bounds of 900 seconds and 1800 seconds respectively.

2. Artillery Movement and Preparedness Times

a. Movement Rate

The movement rate is measured in kilometers/hour and is treated as a normal random variable in the model. The variation makes allowances for varying terrain and security conditions.

b. March Order Time

The march order time is the time interval between time of receipt of an order to move and the time the unit is in march formation ready to proceed with the movement. This time increment is assumed to be a normal variate measured in seconds.

c. Emplacement Time

The emplacement time is the time interval from the time the unit arrives at the new position area and the time the unit is ready to engage a target. The time is a normal variate measured in seconds.

3. Fire Mission Processing Times

Time required to process a particular fire mission is a function of the type of mission. Each of the individual time increments in the firing chain is a truncated normal variate. The parameters defining the distributions of these variates are input parameters. A description of the total processing time for each type mission is given below:

a. Target of Opportunity

There are three distinct phases of an engagement of a target of opportunity, namely: the mission preparation phase, the adjustment phase, and the fire for effect phase. If T_p is the time required for the forward observer to prepare a request for fire, T_t is the time required for the observer to transmit the request for fire to the fire direction center, and T_a is the time required for the

fire direction center to analyze the target, select units to fire, compute the firing data, and transmit the data to the firing units, then T_1, the time required for the mission preparation phase, is simply

$$T_1 = T_p + T_t + T_a \quad .$$

If T_f^i is the time required for the fire unit to prepare and fire the ith volley in adjustment; T_o^i is the time of flight for the ith volley; T_c^i is the time required by the forward observer to determine the necessary adjustment corrections for the 8th volley and transmit them to the fire direction center; T_s^i is the time required for the fire direction center to compute subsequent firing data for the ith volley and transmit it to the adjusting battery; and N_a is the number of volleys required for the adjustment, which is a random variable, then T_2, the time required for the adjustment phase, is

$$T_2 = \sum_{i=1}^{N_a} T_f^i + T_o^i + T_c^i \quad + \sum_{j=1}^{N_a - 1} T_s^j \quad .$$

For the fire for effect phase, a distinction must be made concerning the method for determining subsequent aimpoints after the first. Two mission types are defined to make the distinction clear:

(1) Mission Type 1: N_e volleys are fired, all volleys fired at the same aimpoint.

(2) Mission Type 2: N_e volleys are fired, all volleys being fired at different aimpoints.

If F_a is the time required for the fire direction center to compute firing data for a new mass point, determine the mass point, and transmit the data to the firing units; F_{p1} is the time required for a fire unit to prepare and fire a new volley assuming the firing data are different from the last volley; and F_{p2} is the same as F_{p1} except that it is assumed the same data are fired each time; then T_3, the time required for the fire for effect phase is

$$T_3 = F_a^1 + F_{p1} + T_o^1 + \sum_{i=2}^{N_e} F_{p2}^i + T_o^i$$

for a mission of type 1, or

$$T_3 = \sum_{i=1}^{N_e} F_a^i + F_{p1}^i + T_o^i$$

in the case of mission type 2.

The total time required for a target of opportunity type mission, T_M, is then

$$T_M = T_1 + T_2 + T_3 \quad .$$

b. Scheduled Targets

In the case of scheduled targets, the determination of the initial aimpoint, computation of firing data, and transmission of firing data to the fire units are accomplished during slack time. It is assumed in the model that the initial volley in the case of a scheduled target is fired at a specified time. Using the same notation

developed above, then, the time required for a scheduled target is

$$T_M = T_o^1 + \sum_{i=2}^{N_e} F_{p2}^i + T_o^i$$

for a type 1 mission, or

$$T_M = T_o^1 + \sum_{i=2}^{N_e} F_a^i + F_{p1}^i + T_o^i$$

for a type 2 mission.

c. Preparatory Targets

In the case of preparatory targets, the target is always engaged with a single volley. In the event that there is more than a single target in the preparatory fires scheduled for the same unit, the targets are scheduled two minutes apart. The only time consideration for this type target is the time of flight for the volley.

H. TARGET ENGAGEMENT STRATEGY

The strategy used to engage a specific target is dependent upon the type target being engaged primarily. The engagement strategy in the case of a target of opportunity consists of a decision as to whether or not an adjustment will be conducted, a decision concerning the number of volleys to be fired in effect, and an algorithm for determining what specific aimpoint will be used for each of the volleys.

In the simulation the number of volleys to be used in fire for effect is a discrete random variable the distribution for which is an

input parameter. The model provides for different distributions for targets of opportunity with adjustment and scheduled targets or targets of opportunity without adjustment.

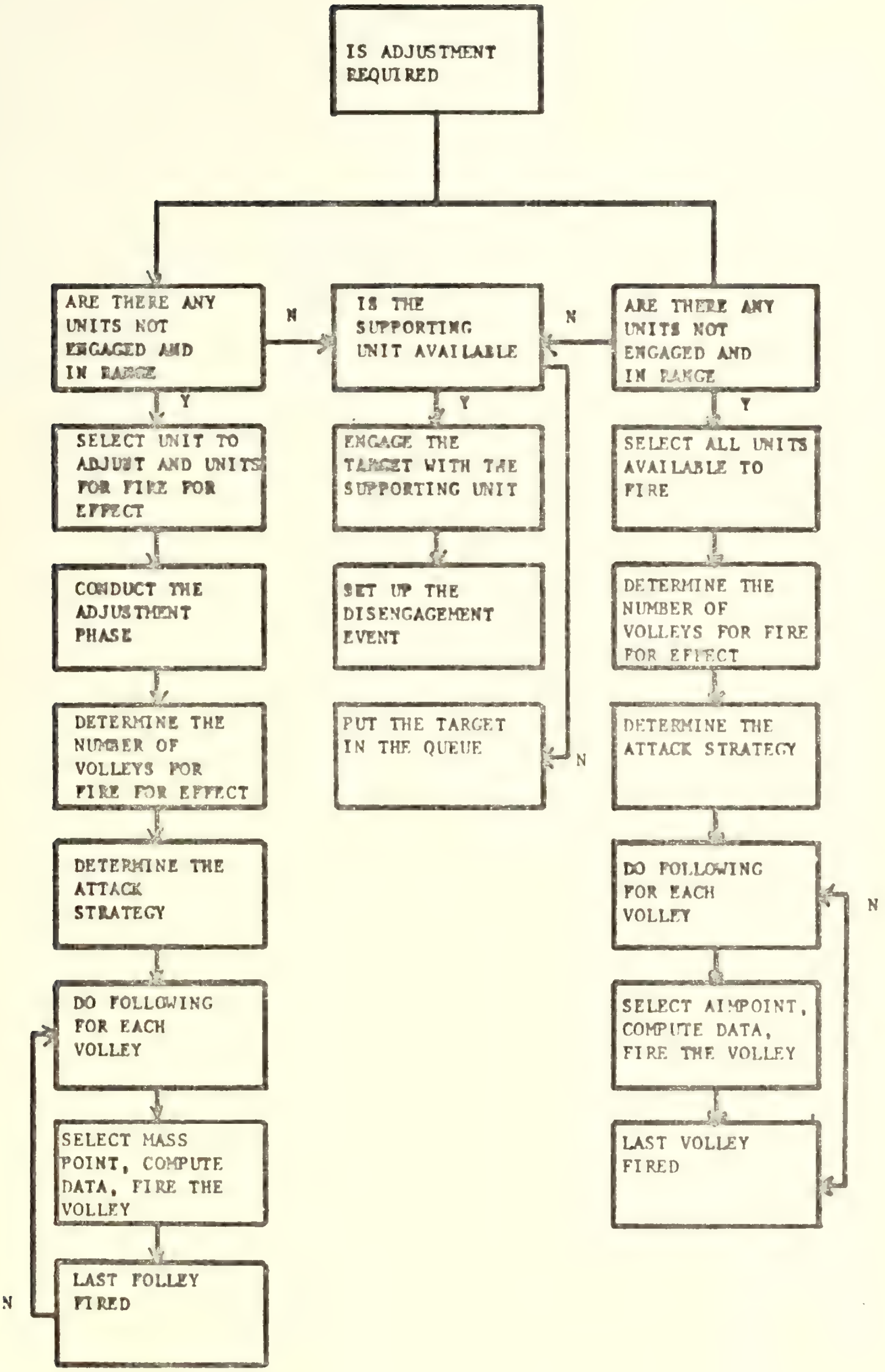
The specific aimpoint for a particular volley in fire for effect is a random variable. For purposes of determining the aimpoint, a rectangle of specified dimensions is superimposed over the reported or adjusted target location. The sides of the rectangle then define the upper and lower limits in range and deflection for the two distributions. The coordinates in easting and northing of the aimpoint are considered to be two independently distributed uniform variates.

The selection of a specific aimpoint then depends in part upon the dimensions of the rectangle. The model provides for the specification of up to eight different sets of specifications and two eight point probability distributions on these specifications. One distribution applies to missions in which adjustment takes place; the other deals with the case where adjustment does not take place. In both cases, the first set of specifications provides for the same aimpoint being used for each volley in the fire for effect phase.

In the case of preparatory targets, the engagement strategy is fixed. In this case, a single volley from a single battery is fired on the reported target location.

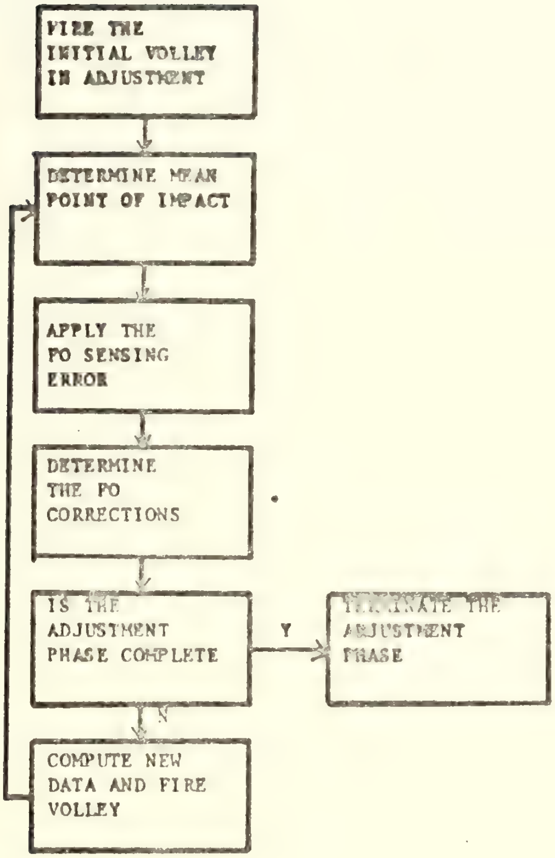
I. TARGET ENGAGEMENT SEQUENCE

The sequence used in firing a target of opportunity is shown in Figure 18. The adjustment sequence is described in greater detail in Figure 19.


IS ADJUSTMENT REQUIRED
ARE THERE ANY UNITS NOT ENGAGED AND IN RANGE
N
IS THE SUPPORTING UNIT AVAILABLE
N
ARE THERE ANY UNITS NOT ENGAGED AND IN RANGE
Y
Y
Y
SELECT UNIT TO ADJUST AND UNITS FOR FIRE FOR EFFECT
ENGAGE THE TARGET WITH THE SUPPORTING UNIT
SELECT ALL UNITS AVAILABLE TO FIRE
CONDUCT THE ADJUSTMENT PHASE
SET UP THE DISENGAGEMENT EVENT
DETERMINE THE NUMBER OF VOLLEYS FOR FIRE FOR EFFECT
DETERMINE THE NUMBER OF VOLLEYS FOR FIRE FOR EFFECT
PUT THE TARGET IN THE QUEUE
N
DETERMINE THE ATTACK STRATEGY
DETERMINE THE ATTACK STRATEGY
DO FOLLOWING FOR EACH VOLLEY
N
DO FOLLOWING FOR EACH VOLLEY
SELECT AIMPOINT, COMPUTE DATA, FIRE THE VOLLEY
SELECT MASS POINT, COMPUTE DATA, FIRE THE VOLLEY
LAST VOLLEY FIRED
N
LAST FOLLEY FIRED

TARGET OF OPPORTUNITY SEQUENCE

FIGURE 18


FIRE THE INITIAL VOLLEY IN ADJUSTMENT
DETERMINE MEAN POINT OF IMPACT
APPLY THE FO SENSING ERROR
DETERMINE THE FO CORRECTIONS
IS THE ADJUSTMENT PHASE COMPLETE
Y
TERMINATE THE ADJUSTMENT PHASE
N
COMPUTE NEW DATA AND FIRE VOLLEY

ADJUSTMENT SEQUENCE

FIGURE 19

Scheduled targets are engaged using the sequence in Figure 20. Preparatory targets use the sequence in Figure 21.

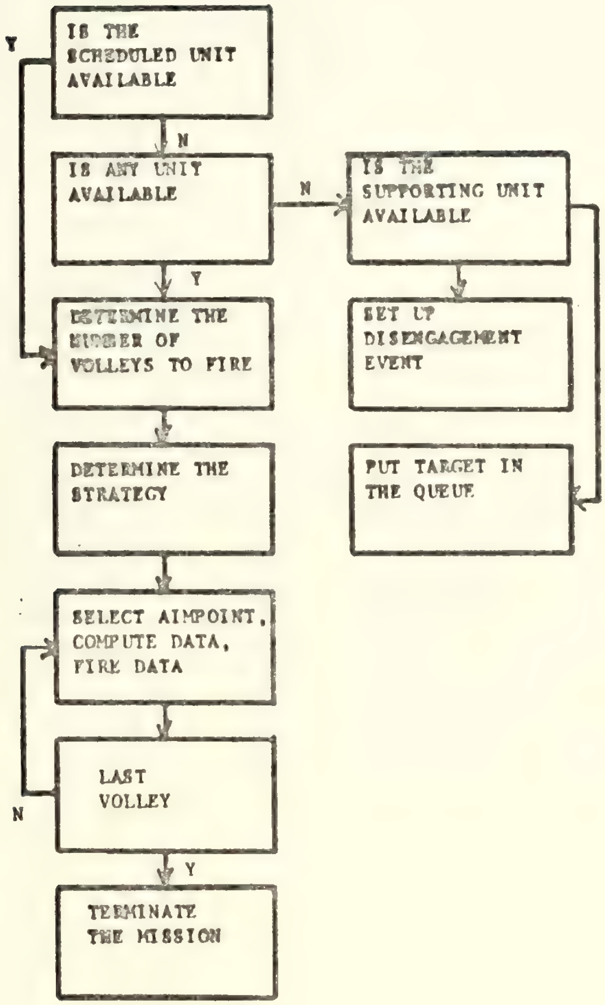
Fire missions are fired as they are generated if units are available. Once the engagement of a target is initiated, it is continued without interruption until the mission is terminated. In the event a mission cannot be fired when the need arises, the mission is placed in a queue until a unit becomes available. There are four queues arranged in priority from one to four. The type target and queue priority are shown below:

(1) Target of Opportunity
(2) Preparatory Target
(3) Scheduled Target
(4) On-Call Target

Upon the completion of a fire mission, the queues are checked in order of priority and if a target is in the queue it is engaged next. In the event of multiple targets in a queue of the same priority, a first-in first-out rule is used.

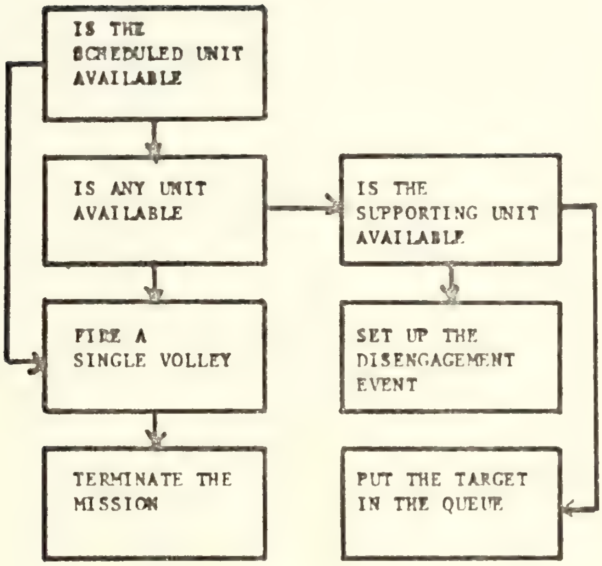
J. LETHALITY AND DAMAGE ASSESSMENT

The targets in the model are homogeneous stationary targets. They are homogeneous to the extent that all target elements are subject to the same lethality function. In actuality, each target element would probably be subject to a different lethality function. For example, an element in a dug-in position with overhead cover some X distance from a burst would not have the same probability of becoming a casualty as another target element the same distance away standing in an erect position.


IS THE SCHEDULED UNIT AVAILABLE
Y
N
IS ANY UNIT AVAILABLE
N
IS THE SUPPORTING UNIT AVAILABLE
Y
DETERMINE THE NUMBER OF VOLLEYS TO FIRE
SET UP DISENGAGEMENT EVENT
DETERMINE THE STRATEGY
PUT TARGET IN THE QUEUE
SELECT AIMPOINT, COMPUTE DATA, FIRE DATA
LAST VOLLEY
N
Y
TERMINATE THE MISSION

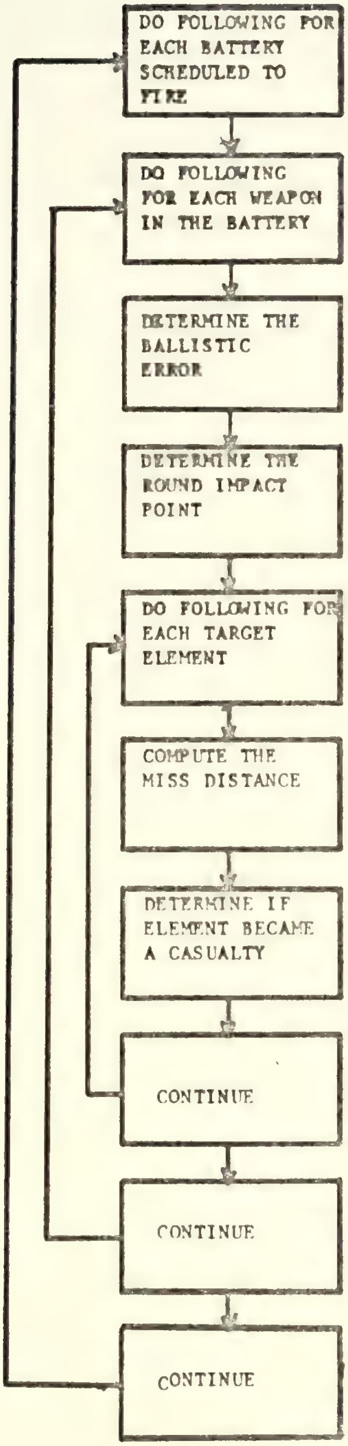
SEQUENCE FOR SCHEDULED TARGET

FIGURE 20


IS THE SCHEDULED UNIT AVAILABLE
IS ANY UNIT AVAILABLE
IS THE SUPPORTING UNIT AVAILABLE
FIRE A SINGLE VOLLEY
SET UP THE DISENGAGEMENT EVENT
TERMINATE THE MISSION
PUT THE TARGET IN THE QUEUE

SEQUENCE FOR A PREPARATORY TARGET

FIGURE 21


DO FOLLOWING FOR EACH BATTERY SCHEDULED TO FIRE
DO FOLLOWING FOR EACH WEAPON IN THE BATTERY
DETERMINE THE BALLISTIC ERROR
DETERMINE THE ROUND IMPACT POINT
DO FOLLOWING FOR EACH TARGET ELEMENT
COMPUTE THE MISS DISTANCE
DETERMINE IF ELEMENT BECAME A CASUALTY
CONTINUE
CONTINUE
CONTINUE

DAMAGE ASSESSMENT FOR A SINGLE VOLLEY

FIGURE 22

It has been shown empirically that target lethality can be described generally as follows (See Weiss):

$$f(x) = e^{\frac{-x^2}{g^2}}$$

In the above relation, f(x) represents the probability that some target element x distance from the burst point will become a casualty. The symbol g represents the parameter of the function. One would expect that

$$g = g(r_1, r_2, r_3, .., r_n)$$

where r_i represents some effect due to specific target element characteristics or the characteristics of the round being fired such as average size of fragmentation, etc.. Since the target set is considered homogeneous and only a single type round is considered available to the units, g becomes a specified parameter and is applicable to each burst and target element combination.

In accomplishing damage assessment each burst is located and the distance to each target element is determined. This distance is the independent argument of the lethality function. The resulting probability of becoming a casualty is determined and the outcome is determined by sampling from a uniform distribution.

IV. EFFECTIVENESS MODEL

Two basic measures of effectiveness are considered in the model, casualty producing rate and the average number of rounds per casualty inflicted. Each of these measures is described briefly in this section.

If T_k is the total engagement time in seconds for the kth target (where the kth target is a target of opportunity) and C_k is the total number of casualties inflicted on the target, then R, the casualty producing rate, is expressed as

$$R = \frac{\sum_{i=1}^{n} T_k}{\sum_{i=1}^{n} C_k} .$$

At the completion of the simulation run, the value of R is calculated and the result is listed in the output report. In addition to the aggregate casualty rate, the casualty producing rate applicable to each target of opportunity is also calculated and is an element in the target history summary for that particular target.

The average number of rounds per casualty is calculated using

$$S = \frac{N}{T}$$

where:

N = Total casualties inflicted on targets of opportunity

T = Total rounds fired on targets of opportunity

Similarly, as above, the appropriate number of rounds per casualty for each target of opportunity is calculated for each separate target also and is an element in the target history summary for that target.

The basic queue statistics for each of the four queues are also provided and serve as secondary measures of effectiveness. For each queue, the average queue length and the average time in the queue for all targets spending time in the queue are provided. The average queue length for each queue is estimated by sampling each queue every 10 seconds during the simulation and then taking a simple average. The average amount of time spent in the queue for targets entering the queue is computed for each queue by taking the simple average over all targets entering the queue in questions, i.e., if K_m is the average time in queue m then

$$K_m = \sum_{i=1}^{N} \frac{T_i^0 - T_i^I}{N}$$

where:

T_i^0 = Time the ith target in the queue left the queue

T_i^I = Time the ith target entered the queue

N = Total number of targets entering the queue

V. DISCUSSION OF THE MODEL

Some typical questions which might be asked concerning an artillery fire support system were introduced in the Introduction to this paper. It is the purpose of this section to enumerate some areas in which this model might be a useful analytical tool and to discuss some basic limitations of the model.

A. POTENTIAL AREAS FOR USE

Potential areas for use are closely related to those system variables which were selected as parameters in the modelling process. These parameters are entered in the input data stream. The parameters can be categorized as pertaining to the following areas: (1) the geometric characteristics of the battlefield and the maneuver force; (2) force movement rates; (3) time factors in the target engagement sequence; (4) geometrical and lethality characteristics of the target complex; (5) target attack strategies; (6) ballistic dispersion; (7) artillery employment configurations; (8) location errors to include artillery unit location errors, burst location errors, and target location errors.

Through the manipulation of the geometric characteristics of the battlefield, the model can be used to gain insight into a number of basic areas, several of which are as follows:

(1) Varying the front line widths can give insight into the sensitivity of the measures of effectiveness to these changes. As the front line width is increased without bound a point is reached where

the supporting artillery is unable to support elements at the extremes of the front line due to the range limitations of the weapon system. The interaction and interdependencies in front line width, maximum weapon range, and artillery unit employment policy in terms of lateral dispersion of fire units and depth displacement can be analyzed as they pertain to the measures of effectiveness.

(2) The distance to the unit objectives has implications on the number of times the supporting artillery units must move forward to support the force, which in turn has an effect on the number of weapons and units available at a given time to satisfy the mission requirements. The model can be used to study the sensitivity of the basic measures of effectiveness to changes in the objective distance. In this regard, weapon maximum range and the movement rates can also be varied to determine what interactions might exist between these, the measures of effectiveness, and the objective distance.

Manipulation of the force movement rates can provide insight into the following basic areas:

(1) As the movement rate of the maneuver force increases, it generally becomes more difficult for the artillery to provide continuous and timely support. The model can be used to investigate the relationship which might exist between the movement rate of the supported force, weapon maximum range, employment policy, etc., and the measures of effectiveness.

(2) The effect of movement rate of the artillery units on the measures of effectiveness can also be investigated.

The time factors in the engagement sequence can be manipulated to study the relationship between the average queue length and the time required to process a mission.

The target characteristics can be manipulated in terms of density, length and width, and vulnerability in terms of lethality characteristics of the weapon target combination, in order to study the sensitivity of the measures of effectiveness to changes in these parameters.

Other studies similar to the above can be conducted pertaining to the other parameters. The sensitivity of the effectiveness measures to the precision with which the forward observer locates the target can slso be investigated. The relative effectiveness of different artillery battery configurations can also be investigated.

B. MODEL LIMITATIONS

There are several basic limitations in the model. Time and resources did not permit the empirical verification of the form of the underlying distributions for the random variables in the model. An effort was made to select from the more common distributions those forms which were most likely from an experience point of view. Representation of the variances of distribution in some cases as linear functions of range is likewise not supported by empirical evidence. The purpose here was to interject a range

dependence on the appropriate error in as simple a fashion as possible. Any investigation to which this is a critical factor should include a more careful modelling of this particular aspect.

While an attempt was made to include most factors in the model which were basic from a system design point of view, many were out of necessity omitted. Two of the more basic factors omitted were logistical constraints and the absence of any error introduced by varying meteorological conditions.

Due to the physical storage constraints in the computer, there is an upper bound on the size of the storage arrays which can be used for storage of critical information. It is possible to select input parameters which will generate more targets than the program is designed to handle simultaneously. In the event insufficient storage is available to handle such cases, the program includes a routine to print out a suitable message to indicate to the user that overflow conditions have been detected and to identify the particular array which is in an overflow condition. Upon the detection of such a condition, the program terminates. The run statistics up until this time are presented prior to termination as if the run had made a normal termination by the brigade achieving the final objective.

APPENDIX A

Program Names

Data is stored in the model in table form. There are three principal tables for storage of information pertaining to units and targets, namely: GDATA, ARDATA, and TGT. A fourth table, PRDATA, is the storage medium for parameters of the probability distributions in the model.

This appendix is organized into five tabs, Tab 1 - Tab 5. Tab 1 through Tab 4 describe the contents of the four tables previously mentioned. Tab 5 identifies the principal miscellaneous variables in the computer program. The tabs are organized as follows:

Tab 1 - GDATA Table
Tab 2 - ARDATA Table
Tab 3 - TGT Table
Tab 4 - PRDATA Table
Tab 5 - Miscellaneous

Tab 1

APPENDIX A

GDATA TABLE

This table contains all information pertaining to each of the seven maneuver elements in the model. The table is organized into seven rows (one for each unit) of 20 columns each (7x20). The table entries are identified as follows:

GDATA(I,1)	Unit identifier for Unit I.
GDATA(I,2)	Current control state for Unit I.
GDATA(I,3)	Easting coordinate of the west front line end point for Unit I.
GDATA(I,4)	Northing coordinate of the west front line end point for Unit I.
GDATA(I,5)	Easting coordinate of the east front line end point for Unit I.
GDATA(I,6)	Northing coordinate of the east front line end point for Unit I.
GDATA(I,7)	Easting coordinate for the current objective center for Unit I.
GDATA(I,8)	Northing coordinate for the current objective center for Unit I.
GDATA(I,9)	Length of the major axis for the current Unit I objective.
GDATA(I,10)	Length of the minor axis for the current Unit I objective.
GDATA(I,11)	Attitude of Unit I objective. The attitude is defined as the clockwise angle measured in radians from true North to the minor axis of the objective. The angle is a uniform variate in the interval (-.528,+.528).

GDATA(I,12)	Easting coordinate of the current fire planning center for Unit I.
GDATA(I,13)	Northing coordinate for the current fire planning center for Unit I.
GDATA(I,14)	Current time in seconds
GDATA(I,15)	Time Unit I entered State 4. If Unit I is not in State 4, this entry is 0.
GDATA(I,16)	Bit indicating the engagement status for Unit I. This entry can have value 1 or 0 with the following significance: 0 - Not currently engaged 1 - Currently engaged A unit is declared to be engaged in the event a target of opportunity originated by the unit is being processed. Accordingly, only units 1-4 can become engaged.
GDATA(I,17)	Easting coordinate of the geometric center of the front line for Unit I.
GDATA(I,18)	Time Unit I became engaged. If the unit is not engaged, this entry has no significance.
GDATA(I,19)	Initial distance to current Unit I objective.
GDATA(I,20)	If the current Unit I objective is a portion of the next higher unit objective, this entry has a value of 1. Otherwise, the value is 0.

Tab 2

APPENDIX A

ARDATA TABLE

This table contains all the information pertaining to each of the artillery units in the model with the exception of the reinforcing artillery unit. This table is dimensioned 4x7x16. Table entries have the following significance:

ARDATA(I,J,1)	Weapon designator for the Jth weapon in Battery I. I takes on values 1,3. J takes on values 1,6.
ARDATA(I,7,2)	Current state of Battery I. If the battery is not engaged, this entry has value 1. If the battery is engaged, the value is 2. If the battery is moving, the value is 3.
ARDATA(I,J,3)	The easting coordinate for the actual location of the Jth weapon in Battery I.
ARDATA(I,J,4)	The northing coordinate for the actual location of the Jth weapon in Battery I.
ARDATA(I,7,3)	The easting coordinate of the actual geometric center of the weapons in Battery I.
ARDATA(I,7,4)	The northing coordinate of the actual geometric center of the weapons in Battery I.
ARDATA(I,7,6)	Azimuth of lay for the Ith Battery. The azimuth of lay is defined as the clockwise angle measured in radians from true North to the base direction for the weapons. The weapons are positioned about a line perpendicular to the azimuth of lay running through the battery center.

ARDATA(I,7,7)	Easting coordinate of the location assigned to the Ith Battery as its next position area.
ARDATA(I,7,8)	Northing coordinate of the location assigned to Battery I as its next position area.
ARDATA(I,7,9)	Current position error in easting for the Ith Battery. This component is computed using the relation: ARDATA(I,7,9) = ARDATA(L,7,3)- ARDATA(I,7,7)
ARDATA(I,7,10)	Current position error in northing for the Ith Battery. The relation used to compute this is: ARDATA(I,7,10) = ARDATA(I,7,4)- ARDATA(I,7,8)
ARDATA(I,7,13)	Cumulative rounds fired by Battery I.
ARDATA(I,7,14)	If Battery I is engaged this entry gives the priority rating of the target being engaged. The ratings are: 1 - Target of Opportunity 2 - Preparatory Target 3 - Scheduled Target 4 - On-Call Target

Note: Table entries not identified above are open storage locations and as such have no preassigned meaning.

Tab 3

APPENDIX A

TGT TABLE

This table contains all the information pertaining to each target in the model from the time the target is generated until action is completed on the target. The table is dimensioned 250x40. Each of the table entries is identified as follows:

TGT(I,1)	Target number assigned to the Ith target.
TGT(I,2)	Maneuver element generating the requirement for fire.
TGT(I,3)	Actual easting coordinate of the target.
TGT(I,4)	Actual northing coordinate of the target.
TGT(I,5)	If the target is a scheduled target, this entry is 1. Otherwise, the entry is 0.
TGT(I,6)	If the target is an on-call target, this entry is 1. Otherwise, the entry is 0.
TGT(I,7)	If the target is a preparatory target, this entry is 1. Otherwise, the entry is 0.
TGT(I,8)	Time the target is scheduled (applies only in the case of the scheduled or preparatory target).
TGT(I,9)	If the target is a target of opportunity, this entry is 1. Otherwise, the entry is 0.
TGT(I,10)	Time the target was originated.

TGT(I,11)	Artillery unit having responsibility for this target. If the target is a prep or scheduled target, the unit scheduled to fire is entered here. If the target is a target of opportunity, the entry is 4 representing the battalion. If supporting artillery is used, the entry is 100.
TGT(I,12)	Time the mission was completed.
TGT(I,13)	Cumulative rounds expended on this target.
TGT(I,14)	Casualties inflicted on this target.
TGT(I,15-17)	Artillery battery capability description indicator. A value of 1 indicates a battery is in range, a 0 indicates a battery is not in range. Batteries are listed in numerical order in cells 15-17.
TGT(I,18)	Total number of units in range of the target.
TGT(I,20)	If the target is a scheduled or preparatory target, this entry is the row number in the event list (EVLIST) which corresponds to the target engagement event.
TGT(I,21)	Easting component of target location error.
TGT(I,22)	Northing component of target location error.
TGT(I,23)	Category of the target for targets of opportunity. If target is not of this type, the entry is insignificant.
TGT(I,24)	Length of the target measured in meters.
TGT(I,25)	Depth of the target measured in meters.
TGT(I,26)	Number of individual target elements.
TGT(I,27)	Target density measured in elements per square meter of target area.

TGT(I,28)	For a target of opportunity, this entry is the identifier for the adjusting artillery unit. Otherwise, the entry is insignificant.
TGT(I,29)	Initial engagement range from the adjusting unit to the adjusting point.
TGT(I,30)	Number of volleys fired in the adjusting phase.
TGT(I,31)	Strategy used in the fire for effect phase.
TGT(I,32)	Number of volleys fired in the fire for effect phase.
TGT(I,33)	Percent casualties inflicted.
TGT(I,34)	Rounds per casualty inflicted.
TGT(I,35)	The total engagement time measured in seconds.
TGT(I,36)	The kill rate measured in casualties per second of engagement.
TGT(I,37)	Time the engagement began.
TGT(I,38)	Information bit for the first volley in the fire for effect phase. This entry is 1 if the current volley is the initial volley. Otherwise, the entry is 0.
TGT(I,39)	This entry has significance only in the case where the target is either a scheduled or preparatory target. When the target is planned, this entry has value 1. When firing responsibility has been determined, this entry is 0.

Note: Storage areas not identified explicitly above are open storage areas.

Tab 4

APPENDIX A

PRDATA TABLE

PRDATA is a four-dimensional table (3x7x20x10) which is the storage medium for the probability distributions corresponding to discrete random variables and the distribution parameters for the continuous variables. PRDATA is divided into three sub-tables. Table entries for each of the tables are identified as follows:

TABLE 1

Name	Note	Description
PRDATA(1,I,2,1-4)	1	Parameters for the truncated normal distribution corresponding to the length of the front line for Unit I.
PRDATA(1,I,3,1-4)	1	Parameters for the truncated normal distribution corresponding to the objective distance in meters for Unit I.
PRDATA(1,I,4,1-4)	1	Parameters for the truncated normal distribution corresponding to the length of the objective major axis for Unit I.
PRDATA(1,I,5,1-4)	1	Parameters for the truncated normal distribution corresponding to the length of the objective minor axis for Unit I.
PRDATA(1,I,6-1-8)		Probability mass points corresponding to the discrete random variable representing the number of targets Unit I will plan during the fireplanning process while in fireplanning State 1.

PRDATA(1,I,7,1-8)		Same as PRDATA(1,I,6,1-8) except the information pertains to fireplanning State 2.
PRDATA(1,I,8,1-3)		Probability a target planned by Unit I in fireplanning State 1 will fall in one of the following categories: 1 - Preparatory 2 - Scheduled 3 - On-Call
PRDATA(1,I,9,1-3)		Same as PRDATA(1,I,8,1-3) except the appropriate fireplanning state is State 2.
PRDATA(1,I,10,1-3)		Given that a target planned by Unit I in fireplanning State 1 is a preparatory target, the probability that the target is located: 1 - On the objective 2 - Between LD and objective 3 - Beyond the objective
PRDATA(1,I,11,1-3)		Same as PRDATA(1,I,10,1-3) except that the fireplanning state is State 2.
PRDATA(1,I,12,1-3)		Same as PRDATA(1,I,10,1-3) except the target type is scheduled.
PRDATA(1,I,13,1-3)		Same as PRDATA(1,I,11,1-3) except the target type is scheduled.
PRDATA(1,I,14,1-3)		Same as PRDATA(1,I,10,1-3) except the target type is on-call.
PRDATA(1,I,15,1-3)		Same as PRDATA(1,I,11,1-3) except the target type is on-call.
PRDATA(1,I,16,1-2)	2	The lower and upper bounds for the uniform variate representing the movement rate for Unit I.

PRDATA(1,I,17,1-4)	3	The parameters for the truncated normal distribution corresponding to the lateral displacement of the objective of Unit I from the unit center line.
PRDATA(1,I,18,1-8)		Values for the discrete random variables representing the number of targets Unit I plans during the fireplanning process when the unit is in fireplanning State 1. These entries correspond to the probability mass values stored in PRDATA(1,I,6,1-8)
PRDATA(1,I,19,1-8)		Same as PRDATA(1,I,18,1-8) except the data pertains to fireplanning State 2. These entries correspond to the probability mass values stored in PRDATA(1,I,7,1-8)

TABLE 2

PRDATA(2,1,4,1-4)	3	The parameters for the truncated normal distribution corresponding to the lateral displacement of the position area for an artillery battery about the center line of the supported unit.
PRDATA(2,1,5,1-4)	4	The parameters for the truncated normal distribution corresponding to the depth displacement of an artillery unit behind the front line of the supported unit.
PRDATA(2,1,6,1-4)	1	Parameters for the truncated normal distribution corresponding to the movement rate in kilometers/hour for an artillery battery.
PRDATA(2,1,8,1-4)	1	Parameters for the truncated normal distribution corresponding to the emplacement time for an artillery battery measured in seconds.

PRDATA(2,1,9,1-4)	5	Parameters for the truncated normal distribution corresponding to the component error in easting and northing between the assigned location for the unit and the actual occupied location.
PRDATA(2,I,10,1-4)	6	The lower and upper bounds for the uniform variate corresponding to the coordinates of weapon 1 in Battery I. The coordinates are measured in the coordinate system with origin at the battery center and positive y axis aligned along the assigned azimuth of lay for the battery.
PRDATA(2,I,11-15,1-4)	6	Same as PRDATA(2,I,10,1-4) except the information pertains to weapons 2-6 in Battery I.
PRDATA(2,4,2,1-4)	1	Parameters for the truncated normal distribution corresponding to the time required for the forward observer to prepare a request for fire for a target of opportunity. The time increment is measured in seconds.
PRDATA(2,4,3,1-4)	1	Same as above except the time increment is the time measured in seconds for the forward observer to transmit the request for fire to the Fire Direction Center.
PRDATA(2,4,4,1-4)	1	Same as above except the time increment is the target analysis time in the Fire Direction Center. During this time period, the target is analyzed and units are selected to engage and/or adjust when appropriate.
PRDATA(2,1,5,1-4)	1	Same as above except the time increment is the time required for an adjusting unit to prepare and fire a volley in adjustment.

PRDATA(2,1,6,1-4)	1	Same as above except the time increment is the time required for the forward observer to make adjustment corrections and transmit them to the Fire Direction Center.
PRDATA(2,1,7,1-4)	1	Same as above. Time increment is the time required for the FDC to compute new adjusting data and transmit to the adjusting unit.
PRDATA(2,1,8,1-4)	1	Same as above except the time increment is that time required for the FDC to select a mass point in the fire for effect phase, compute the data, and send the data to the firing units.
PRDATA(2,1,9,1-4)	1	Same as above except the time increment is the time required for firing a unit to prepare and fire a volley in the fire for effect phase when the firing data is the same as that for the previous round.
PRDATA(2,4,10,1-4)	1	Same as above except the time increment is that time required for a firing unit to prepare and fire a volley in the fire for effect phase when the firing data has been changed.
PRDATA(2,4,11,1-4)	1	Same as above except the time increment is the time required for the reinforcing artillery unit to engage a target of opportunity.
PRDATA(2,4,12,1-4)	1	Same as above except the time increment is the time required for the reinforcing artillery unit to shoot a scheduled target.
PRDATA(2,4,13,1-4)	1	Same as above except the time increment is the time required for the reinforcing artillery unit to shoot a preparatory target.

PRDATA(2,5,2,1-4)	7	Parameters for the truncated normal distribution corresponding to the deflection deviation error in target location for a target of opportunity.
PRDATA(2,5,3,1-4)	7	Parameters for the truncated normal distribution corresponding to the range error in target location for a target of opportunity.
PRDATA(2,5,4,1-4)	7	Parameters for the truncated normal distribution corresponding to the deflection error in burst location sensing by the forward observer.
PRDATA(2,5,5,1-4)	7	Parameters for the truncated normal distribution corresponding to the range error in burst location sensing by the forward observer.

TABLE 3

PRDATA(3,1,1,1-4)	1	Parameters for the truncated normal distribution corresponding to the lateral length in meters for a Category I target.
PRDATA(3,1,2,1-4)	1	Parameters for the truncated normal distribution corresponding to the depth of Zone 1 in meters for a Category I target.
PRDATA(3,1,3,1-4)	1	Same as PRDATA(3,1,2,1-4) except the zone is Zone 2.
PRDATA(3,1,4,1-4)	1	Same as PRDATA(3,1,2,1-4) except the zone is Zone 3.
PRDATA(3,1,5,1-4)	1	Same as PRDATA(3,1,1,1-4) except the target is a Category II target.
PRDATA(3,1,6,1-4)	1	Same as PRDATA(3,1,2,1-4) except the data is for a Category II target.

PRDATA(3,1,7,1-4)	1	Same as PRDATA(3,1,3,1-4) except the data is for a Category II target.
PRDATA(3,1,8,1-4)	1	Same as PRDATA(3,1,4,1-4) except the data is for a Category II target.
PRDATA(3,1,9,1-2)	2	The lower and upper bounds on the uniform variate representing the number of target elements in a target of Category I.
PRDATA(3,1,10,1-2)	2	Same as PRDATA(3,1,9,1-2) except the data pertains to a Category II target.
PRDATA(3,1,11,1)		Probability that a random target is a Category I target.
PRDATA(3,2,J,1-2)		The length and width of the aimpoint rectangle for Strategy J. J=2,8.
PRDATA(3,2,9,1-8)		The probability mass values associated with the selection of each of the strategies for a fire for effect mission.
PRDATA(3,2,10,1-8)		Probability mass values corresponding to the values of the discrete random variable representing the number of volleys in fire for effect for an adjustment mission.
PRDATA(3,2,11,1-8)		The values of the discrete random variable corresponding to the mass function in PRDATA(3,2,10,1-8).
PRDATA(3,2,12,1-8)		Same as PRDATA(3,2,10,1-8) except for the scheduled type target.
PRDATA(3,2,13,1-8)		Same as PRDATA(3,2,11,1-8) except for the scheduled type target.

PRDATA(3,2,14,1-8)	Same as PRDATA(3,2,9,1-8) except the type target is scheduled.

NOTES

1 - Data is entered in the following order: mean, variance, lower bound, upper bound.

2 - Data is entered in the following order: lower bound, upper bound.

3 - The lower bound and the upper bound correspond to the lateral boundaries of the maneuver element involved.

4 - The lower bound is a point a distance equal to the maximum range behind the fireplanning center of the supported unit. The upper bound is the supported unit fireplanning center.

5 - The lateral bounds on the easting component of error are the same as in Note 3. The bounds on the northing component are as described in Note 4.

6 - Data is entered in the following order: lower bound on y coordinate, upper bound on y coordinate, lower bound on x coordinate, upper bound on x coordinate.

7 - In each case, the distribution mean is 0 and the variance is a linear function of the appropriate distance. Data is entered in the following order: a, b, c, d where

a = Intercept of the linear function Var = a+b(dist)

b = Slope of the above function

c = 0

d = Absolute value of upper bound on the error component

Tab 5

APPENDIX A

MISCELLANEOUS

Descriptions of the principal miscellaneous variables in the model are:

Name	Description
ITGT	Target number of the last target generated at any particular point in time.
IROW	The row number of the current event in the event list.
CTIME	Current time.
TINC,TOPT,SHOUR	General purpose time variables.
J100,J200	General purpose counting variables.
EXMN	The mean intergeneration times for targets of opportunity. This increment is exponentially distributed.
XLETH	The parameter "g" in the general lethality fucntion $f(x) = e^{\frac{-x^2}{g^2}}$ where "x" is the radial miss distance and f(x) is the probability a target element located a distance "x" away from the burst point becomes a casualty.
XTLETH	General purpose variable.
NU	The current seed for the random number generator.

FD105(I,J,K)	The ballistic firing parameters. I refers to charge, J is the range increment, and K indexes the type data, i.e., 1 - Range Probable Error 2 - Deflection Probable Error 3 - Time of Flight
SUP(I)	General storage for information pertaining to the reinforcing artillery unit.
RMAX	The maximum range of the artillery weapons.
NGUNS	Number of guns in the artillery batteries. This is preset at value of 6.
Q(I)	Current length of each of the queues.
QUES(I,J,K)	Temporary storage area for event vectors corresponding to targets in queue.
NCHGS	The number od charges available.
NRINC	The number of range increments for the ballistic data.
STAT(I,1)	Cumulative queue length for queue I.
STAT(I,2)	Number of times the queue length has been sampled for queue I.
STAT(I+4,1)	Cumulative time spent in queue I for targets entering queue I.
STAT(I+4,2)	Number of targets entering queue I.
STAT(9,1)	Cumulative number of casualties inflicted on targets of opportunity.
STAT(9,2)	Cumulative engagement time for targets of opportunity.
STAT(10,1)	Cumulative rounds fired on target of opportunity.
STAT(10,2)	Cumulative number of casualties inflicted on targets of opportunity.

APPENDIX B

Model Input Parameters

Model input parameters must be arranged in accordance with this appendix.

Card #	Columns	Type/Format	Description
1	1-10	F10.2	Distribution mean for the random variable (r.v.) of front line length for a company size element.
	11-20	F10.2	Distribution variance for front line length for a company size element.
	21-30	F10.2	Lower bound on front line length for a company size element.
	31-40	F10.2	Upper bound on front line length for company size element.
2	1-10	F10.2	Distribution mean for the r.v. representing the objective distance for a company size element.
	11-20	F10.2	Variance for objective distance for company size element.
	21-30	F10.2	Blank
	31-40	F10.2	Upper bound on objective distance for company size element.
3	1-10	F10.2	Distribution mean for the r.v. representing the length of the major axis of the unit objective for a company size element.
	11-20	F10.2	Variance in length of objective major axis for company size element.

3	21-30	F10.2	Lower bound on length of objective major axis for company size element.
	31-40	F10.2	Upper bound on length of objective major axis for company size element
4	1-10	F10.2	Distribution mean for r.v. representing the length of the minor axis for a company size objective.
	11-20	F10.2	Variance in length of minor axis for a company size objective.
	21-30	F10.2	Lower bound on length of the objective minor axis for company size element.
	31-40	F10.2	Upper bound on length of objective minor axis for company size element.
5-8	1-40	4F10.2	Same information as on cards 1-4 except for the appropriate unit size is battalion.
9-12	1-40	4F10.2	Same information as on cards 1-4 except unit is brigade size.
13	1-10	F10.2	Lower bound on the r.v. representing the company movement rate expressed in kilometers/hour.
	11-20	F10.2	Upper bound on company movement rate.
14	1-10	F10.2	Distribution variance for the r.v. representing the deviation of the location of the objective center about the unit center line in easting. Data is for a company size element.
	11-20	F10.2	Same as for columns 1-10 except that the data is for a battalion size element.

14	21-30	F10.2	Same as for colums 1-10 except the appropriate unit size is brigade.
15	1-80	8F10.2	Values of the discrete r.v. representing the number of targets a company size element will plan while conducting fireplanning in fireplanning state 1. Eight values may be entered.
16	1-80	8F10.2	Probability mass associated with each of the values entered on card 15.
17	1-80	8F10.2	Same information as card 15 except the appropriate unit fireplanning state is state 2.
18	1-80	8F10.2	Same as card 16 except the fireplanning state is state 2.
19	1-10	F10.2	Probability that a randomly selected target planned by a company size element in fireplanning state 1 is a preparatory target.
	11-20	F10.2	Probability that a randomly selected target planned by a company size element in fireplanning state 1 is a scheduled, non-preparatory target.
	21-30	F10.2	Probability that a randomly selected target planned by a company size element in fireplanning state 1 is an on-call target.

Note: Entries must sum to 1.0

20	1-30	3F10.2	Same as card 19 except that the fireplanning state is fireplanning state 2.
21	1-10	F10.2	Probability that a randomly selected company planned preparatory target, planned in fireplanning state 1, is located on the company objective.

	11-20	F10.2	Same as columns 1-10 except that the location category is between the LD and the objective.
21	21-30	F10.2	Same as columns 1-10 except that the location category is beyond the objective.
22	1-30	3F10.2	Same information as on card 21 except that the fireplanning state is state 2.
23	1-30	3F10.2	Same as card 21 except that the target is a scheduled, non-preparatory target, and the fireplanning state is state 1.
24	1-30	3F10.2	Same as card 21 except that the target is a scheduled, non-preparatory target, and the fireplanning state is state 2.
25	1-30	3F10.2	Same as card 21 except that the target is an on-call target and the fireplanning state is state 1.
26	1-30	3F10.2	Same as card 21 except that the target is an on-call target and the fireplanning state is state 2.
27-38	1-80	8F10.2	Same as cards 15-26 except that the unit size is battalion.
39-50	1-80	8F10.2	Same as cards 15-26 except that the unit size is brigade.
51	1-10	F10.2	Blank
	11-20	F10.2	Distribution variance for the r.v. representing the deviation of the location of the battery assigned position in easting about the supported unit center line.
	21-80		Blank

52	1-10	F10.2	Distribution mean for the r.v. representing the distance of the assigned battery center behind the front line of the supported unit.
	11-20	F10.2	Variance in the distance of the assigned battery center behind the front line.
53	1-10	F10.2	Distribution mean for the random variable representing the time required for the battery to march order, measured in seconds.
	11-20	F10.2	Distribution variance for battery march order time.
	21-30	F10.2	Lower bound on battery march order time, measured in seconds.
	31-40	F10.2	Upper bound on battery march order time measured in seconds.
54	1-10	F10.2	Distribution mean for the r.v. representing the battery movement rate, measured in kilometers/hour.
	11-20	F10.2	Distribution variance for the battery movement rate.
	21-30	F10.2	Lower bound on the battery movement rate.
	31-40	F10.2	Upper bound on the battery movement rate.
55	1-10	F10.2	Distribution mean for the r.v. representing the time required for the artillery battery to emplace its weapons. The time is measured in seconds.
	11-20	F10.2	Variance in battery emplacement time.
	21-30	F10.2	Lower bound on battery emplacement time.

	31-40	F10.2	Upper bound on battery emplacement time.
56	1-10	F10.2	Blank
	11-20	F10.2	Distribution variance for the r.v. representing the magnitude of the x and y components of error in locating the battery position center.
	21-30		Blank
	31-40	F10.2	Upper bound on the x and y components of error.
57	1-10	F10.2	Lower bound on the r.v. representing the y coordinate of weapon number 1 in the coordinate system with origin at the battery geometrical center and the positive y axis as the direction of fire.
	11-20	F10.2	Upper bound on the r.v. representing the y coordinate of weapon number 1.
	21-30	F10.2	Lower bound on the r.v. representing the x coordinate of weapon number 1 in the coordinate system previously described.
	31-40	F10.2	Upper bound on the r.v. representing the x coordinate of weapon number 1.
58	1-40	4F10.2	Same information as card 57 except the data pertains to weapon number 2.
59	1-40	4F10.2	Same information as card 57 except the data pertains to weapon number 3.
60	1-40	4F10.2	Same information as card 57 except the data pertains to weapon number 4.

61	1-40	4F10.2	Same information as card 58 except the data pertains to weapon number 5.
62	1-40	4F10.2	Same information as card 57 except the data pertains to weapon number 6.
63	1-10	F10.2	Distribution mean for the r.v. representing the time required for the forward observer to prepare a fire mission request for a target of opportunity. Time is measured in seconds.
	11-20	F10.2	Distribution variance for the above.
	21-30	F10.2	Lower bound on the time required for the forward observer to prepare a fire mission request, measured in seconds.
64	1-40	4F10.2	Same as for card 63 except that the time increment is the time required for the forward observer to transmit the request for fire to the Fire Direction Center. The increment is measured in seconds.
65	1-40	4F10.2	Same as card 63 except the time increment is the time required to analyze the target, select units to engage the target, and select a unit to adjust.
66	1-40	4F10.2	Same as card 63 except that the time increment is the time required for the adjusting unit to prepare and fire a volley in adjustment.
67	1-40	4F10.2	Same as card 63 except the time increment is the time required for the forward observer to determine the adjustment corrections and forward them to the fire direction center.

68	1-40	4F10.2	Same as card 63 except the time increment is the time required for the fire direction center to compute adjustment corrections and transmit new firing data to the adjusting unit.
69	1-40	4F10.2	Same as card 63 except the time increment is the time required for the fire direction center to select a mass point, compute the firing data, and transmit the fire commands to the firing units.
70	1-40	4F10.2	Same as card 63 except the time increment is the time required for the firing unit to prepare and fire a volley in the fire for effect phase when the firing data is different from that used for the previous volley.
71	1-40	4F10.2	Same as card 63 except the time increment is the time required for a firing unit to prepare and fire a volley in the fire for effect phase when the firing data has not changed.
72	1-40	4F10.2	Same as card 63 except the time increment is the time required for the reinforcing artillery unit to conduct an engagement of a target of opportunity.
73	1-40	4F10.2	Same as card 63 except the time increment is the time required for the reinforcing artillery unit to conduct an engagement of a scheduled target.
74	1-40	4F10.2	Same as card 65 except the time increment is the time required for the reinforcing artillery unit to conduct an engagement of a preparatory target.
75	1-10	F10.2	Intercept for the linear function representing the distribution variance for the deviation component of target location error.

	11-20	F10.2	Slope for the above function.
	21-30	F10.2	Blank
	31-40	F10.2	The upper bound on the deviation error described above.
76	1-40	4F10.2	Same as card 75 except the data is for the range component of target location error.
77	1-40	4F10.2	Same as card 75 except the data is for the deviation component of burst location error.
78	1-40	4F10.2	Same as card 75 except data is for the range component of burst location error.
79	1-10	F10.2	Width of fire for effect rectangle corresponding to fire for effect strategy 2.
	11-20	F10.2	Depth of fire for effect rectangle above.

Note: Strategy 1 is defined internally in the model and corresponds to that strategy which specifies that each volley in the fire for effect phase is fired at the adjusted target location or the reported target location as appropriate for the mission.

80	1-20	2F10.2	Same as card 79 except the information pertains to strategy 3.
81	1-20	2F10.2	Same as card 79 except the information pertains to strategy 4.
82	1-20	2F10.2	Same as card 79 except the information pertains to strategy 5.
83-85	1-20	2F10.2	Same as card 79 except the information pertains to strategies 6-8.
86	1-80	8F10.2	Probability mass values corresponding to the adoption of each of the 8 attach strategies when firing for effect on a target of opportunity.

87	1-80	8F10.2	Values of the discrete random variables corresponding to the number of volleys to be fired in effect when a target of opportunity is being engaged.
88	1-80	8F10.2	Probability mass values corresponding to each of the values described for card 87.
89	1-80	8F10.2	Values of the discrete random variable corresponding to the number of volleys to be fired in effect when a scheduled target is being engaged.
90	1-80	8F10.2	Probability mass values corresponding to each of the values described for card 89.
91	1-80	8F10.2	Probability mass values corresponding to the adoption of each of the 8 attack strategies when firing for effect on a scheduled target.
92	1-10	I10	The number of charges for which ballistic firing data is to be entered.
	11-20	I10	The number of range increments to be used. Each range increment is assigned a value of 500 meters.
93	1-10	F10.2	Maximum effective range for the artillery weapon being considered. Must equal the number of range increments times 500.
94-N	1-80	8F10.2	See Block Description below.

BLOCK DESCRIPTION: The weapon ballistic firing parameters are input in this block of data. The data is organized into sub-blocks by charge. Data within each sub-block is entered in the following order: range probable errors, deflection probable errors, and last, time of flight. For each category, i.e., probable errors, etc., exactly NRINC data points must be provided. In the event that some particular charge cannot achieve a range greater than, say, ROTO, then enter the value 1000. For each

range probable error entry after the entry corresponding to RTOT, a value of 0 suffices for the entry corresponding to deflection probable error and time of flight.

N+1	1-10	I10	The seed for the random number generator.
	11-20	I10	Enter the value 6.
N+2	1-10	I10	Probability that a random target is of size category I.
N+3	1-10	F10.2	Distribution mean for the random variable representing the lateral length of a target of size category I. The data is entered in meters.
	11-20	F10.2	The distribution variance for the above.
	21-30	F10.2	Lower bound on the lateral length of target of size category I.
	31-40	F10.2	Upper bound on the lateral length of target of size category I.
N+4	1-40	4F10.2	Same information as card N+3 except the data pertains to the depth of Zone 1 for a Category I target.
N+5	1-40	4F10.2	Same as card N+3 except the data is for Zone 2.
N+6	1-40	4F10.2	Same as card N+3 except the data is for Zone 3.
(N+7)-(N+10)	1-40	4F10.2	Same as cards (N+3)-(N+6) except data pertains to Category II target.
N+11	1-10	F10.2	Lower bound on the number of target elements in a target of Category I.
	11-20	F10.2	Upper bound on the number of target elements in a target of Category I.

N+12	1-20	2F10.2	Same as card N+11 except the data applies to a target in Category II.

A sample input deck is shown in the attachment hereto.

SAMPLE DATA DECK

```
3000.           28000.          1000.           5000.
6000.           28000.                          8000.
500.             5000.          200.            800.
250.            500.            200.            400.
6000.           56000.          2100.           10000.
10000.          28000.                          15000.
1000.           5000.           500.            1500.
750.            5000.           500.            1000.
12000.          28000.          10000.          14000.
30000.          30000.                          40000.
2500.           25000.          1800.           3200.
1250.           25000.          1000.           1500.
2.              4.
25000.          25000.          25000.
2.              2.              2.              2.
.2              .2              .2              .2              .05             .05             .1
2.              2.              2.              2.
.6              .3              .1
.1              .6              .3
                .2              .8
.3              .6              .1
.8              .1              .1
.1              .6              .3
.3              .5              .2
.6              .3              .2
.8              .2
2.              2.              2.              2.
.6              .3              .1
2.              2.              2.              2.
.8              .1              .1
.3              .4              .2
.4              .3              .3
.2              .1              .7
.8              .1              .1
.9              .1
.6              .3              .1
.8              .2
.6              .3              .1
2.              2.              2.              2.
.6              .3              .1
2.              2.              2.              2.
.6              .3              .1
.6              .3              .1
.2              .3              .5
                .5              .5
.8              .2              .1
```

```
.6         .3         .1
           .2         .8
.2         .1         .7
.6         .3         .1
                      8000000.
1000.      20000.
600.       6000.      400.       800.
20.        400.       10.        30.
360.       400.       300.       420.
           9000.                 1200.
10.        10.        -50.       -50.
-10.       -10.       -30.       -30.
10.        10.        -10.       -10.
10.        10.        10.        10.
-10.       -10.       30.        30.
10.        10.        50.        50.
50.        500.       25.        75.
30.        500.       15.        45.
60.        500.       50.        70.
25.        500.       20.        35.
20.        500.       15.        35.
30.        500.       15.        45.
30.        500.       20.        40.
60.        300.       50.        70.
15.                   15.        15.
1200.      200.       1000.      1400.
900.       800.       700.       1100.
300.                  200.       400.
200.       .03                   500.
2000.      .3                    1000.
200.       .03                   400.
200.       .03                   400.
500.       200.
400.       300.
600.       200.
150.       200.
195.       200.
400.       325.
75.        20.
.6         .05        .05        .1         .05        .05        .05        .05
.2         .8
6.         3.
.5         .5
6.         1.
.3         .7
         4         22
11000.
3.         5.         6.         8.         10.        12.        15.        17.
```

```
20.        24.        27.        1000.      1000.      1000.      1000.      1000.
1000.      10000.     1000.      1000.      1000.      1000.      1000.      1000.
0.         1.         1.         1.         1.         2.         2.         2.
3.         3.         4.

1.9        3.9        5.9        8.1        10.3       12.6       15.1       17.8
20.8       24.3       29.1

4.         5.         6.         8.         9.         11.        13.        16.
18.        21.        24.        28.        32.        36.        1000.      1000.
1000.      1000.      1000.      1000.      1000.      1000.      1000.      1000.
0.         1.         1.         1.         1.         2.         2.         2.
3.         3.         3.         4.         4.         5.

1.7        3.4        5.2        7.0        8.9        10.8       12.8       15.0
17.2       19.6       22.2       25.1       28.5       33.0

5.         5.         6.         7.         8.         9.         10.        11.
12.        13.        15.        17.        19.        21.        23.        26.
28.        31.        1000.      1000.      1000.      1000.      1000.      1000.
0.         1.         1.         1.         1.         2.         2.         2.
3.         3.         3.         4.         4.         4.         5.         5.
6.         7.
1.4        2.9        4.5        6.1        7.8        9.5        11.3       13.1
15.0       17.0       19.0       21.2       23.5       26.0       28.7       31.8
35.5       41.4
8.         8.         8.         8.         8.         9.         10.        10.
11.        11.        12.        13.        13.        14.        14.        15.
16.        17.        18.        19.        20.        21.        1000.      1000.
0.         1.         1.         1.         1.         2.         2.         2.
3.         3.         3.         4.         4.         4.         5.         5.
5.         6.         6.         7.         7.         9.
1.1        2.3        3.6        4.9        6.4        8.0        9.6        11.2
12.9       14.7       16.5       18.4       20.4       22.4       24.5       26.7
29.1       31.7       34.5       37.7       41.6       48.4
     12371            6
.6
300.       300.       100.       400.
100.       300.       50.        125.
100.       300.       50.        125.
50.        300.       25.        75.
400.       1200.      300.       500.
65.        300.       60.        70.
65.        300.       60.        70.
65.        300.       60.        70.
185.       300.
60.        120.
4800.
```

Blank

52.3

APPENDIX C

Model Output

Extracts of the output for a sample computer run are attached as a tab hereto. The output report is organized according to the following scheme:

- Part I Input Parameters
  - Section I Maneuver Element Parameters
  - Section II Fireplanning Parameters
  - Section III Artillery Unit Parameters
  - Section IV Fire Mission Processing Parameters
  - Section V Target Characteristic Parameters
  - Section VI Target Attack Strategy Parameters
  - Section VII Artillery Ballistic Data
  - Section VIII Burst Lethality Data

- Part II Initial Situation
  - Section I Initial Maneuver Element Dispositions
  - Section II Initial Artillery Unit Dispositions

- Part III Initial Fire Plan

- Part IV Run Results
  - Section I Event Vector Listing
  - Section II Targets of Opportunity Engaged
  - Section III Scheduled and Preparatory Targets Engaged
  - Section IV Reinforcing Unit Targets
  - Section V Summary Data

PART I

SECTION I

BASIC MANEUVER ELEMENT PARAMETERS

DESCRIPTION	TYPE OF DISTRIBUTION	MEAN	VARIANCE	LOWER LIMIT	UPPER LIMIT
		BRIGADE DATA			
WIDTH OF FRONT	TRUNCATED NORMAL	12000.00	28000.00	10000.00	14000.00
DISTANCE TO OBJECTIVE	TRUNCATED NORMAL	30000.00	30000.00	0.0	40000.00
LENGTH OF OBJ MAJ AXIS	TRUNCATED NORMAL	2500.00	25000.00	1800.00	3200.00
LENGTH OF OBJ MIN AXIS	TRUNCATED NORMAL	1250.00	25000.00	1000.00	1500.00
MOVEMENT RATE (KM/HR)	UNIFORM			2.00	4.00
LATERAL DISPLACEMENT OF UNIT OBJECTIVE ABOUT UNIT CENTER LINE	TRUNCATED NORMAL	0.0	25000.00	SEE NOTE	
		BATTALION DATA			
WIDTH OF FRONT	TRUNCATED NORMAL	6000.00	56000.00	2100.00	10000.00
DISTANCE TO OBJECTIVE	TRUNCATED NORMAL	10000.00	28000.00	0.0	15000.00
LENGTH OF OBJ MAJ AXIS	TRUNCATED NORMAL	1000.00	5000.00	500.00	1500.00
LENGTH OF OBJ MIN AXIS	TRUNCATED NORMAL	750.00	5000.00	500.00	1000.00
MOVEMENT RATE (KM/HR)	UNIFORM			2.00	4.00
LATERAL DISPLACEMENT OF UNIT OBJECTIVE ABOUT UNIT CENTER LINE	TRUNCATED NORMAL	0.0	25000.00	SEE NOTE	
		COMPANY DATA			
WIDTH OF FRONT	TRUNCATED NORMAL	3000.00	28000.00	1000.00	5000.00
DISTANCE TO OBJECTIVE	TRUNCATED NORMAL	6000.00	28000.00	0.0	8000.00
LENGTH OF OBJ MAJ AXIS	TRUNCATED NORMAL	500.00	5000.00	200.00	800.00
LENGTH OF OBJ MIN AXIS	TRUNCATED NORMAL	250.00	500.00	200.00	400.00
MOVEMENT RATE (KM/HR)	UNIFORM			2.00	4.00
LATERAL DISPLACEMENT OF UNIT OBJECTIVE ABOUT UNIT CENTER LINE	TRUNCATED NORMAL	0.0	25000.00	SEE NOTE	

NOTES

(1) ALL DISTANCE MEASUREMENTS ARE IN METERS
(2) BOUNDS OF THE LATERAL DISPLACEMENT OF THE UNIT OBJECTIVES ARE FUNCTIONS OF THE RESPECTIVE UNIT LEFT AND RIGHT BOUNDARIES

```
                                                SECTION II

                                         FIREPLANNING PARAMETERS

                                               BRIGADE DATA

                                          FIREPLANNING STATE 1
                                          --------------------

VALUES FOR NUMBER OF TARGETS UNIT WILL                                    2.00  2.00  2.00  2.00  0.0   0.0   0.0   0.0
PLAN IN THE FIREPLANNING PROCESS

PROBABILITIES ASSOCIATED WITH THE ABOVE VALUES                            0.60  0.30  0.10  0.0   0.0   0.0   0.0   0.0

PROBABILITY THAT A RANDOM TARGET IS A                                     0.60  0.30  0.10
PREPARATORY TARGET, SCHEDULED TARGET
OR AN ON CALL TARGET

PROBABILITY THAT A RANDOM PREPARATORY TARGET                              0.0   0.50  0.50
IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM SCHEDULED                                       0.60  0.30  0.10
TARGET IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM ON CALL TARGET                                  0.20  0.10  0.70
IS LOCATED ON THE UNIT OBJECTIVE,BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE



                                          FIREPLANNING STATE 2
                                          --------------------

VALUES FOR NUMBER OF TARGETS UNIT WILL                                    2.00  2.00  2.00  2.00  0.0   0.0   0.0   0.0
PLAN IN THE FIREPLANNING PROCESS

PROBABILITIES ASSOCIATED WITH THE ABOVE VALUES                            0.60  0.30  0.10  0.0   0.0   0.0   0.0   0.0

PROBABILITY THAT A RANDOM TARGET IS A                                     0.20  0.30  0.50
PREPARATORY TARGET, SCHEDULED TARGET
OR AN ON CALL TARGET

PROBABILITY THAT A RANDOM PREPARATORY TARGET                              0.80  0.20  0.10
IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM SCHEDULED                                       0.0   0.20  0.80
TARGET IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM ON CALL TARGET                                  0.60  0.30  0.10
IS LOCATED ON THE UNIT OBJECTIVE,BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE
```

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                                          FIREPLANNING STATE 1
                                          --------------------

VALUES FOR NUMBER OF TARGETS UNIT WILL                                     2.00  2.00  2.00  2.00  0.0   0.0   0.0   0.0
PLAN IN THE FIREPLANNING PROCESS

PROBABILITIES ASSOCIATED WITH THE ABOVE VALUES                             0.60  0.30  0.10  0.0   0.0   0.0   0.0   0.0

PROBABILITY THAT A RANDOM TARGET IS A                                      0.30  0.40  0.20
PREPARATORY TARGET, SCHEDULED TARGET
OR AN ON CALL TARGET

PROBABILITY THAT A RANDOM PREPARATORY TARGET                               0.20  0.10  0.70
IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM SCHEDULED                                        0.90  0.10  0.0
TARGET IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM ON CALL TARGET                                   0.80  0.20  0.0
IS LOCATED ON THE UNIT OBJECTIVE,BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE



                                          FIREPLANNING STATE 2
                                          --------------------

VALUES FOR NUMBER OF TARGETS UNIT WILL                                     2.00  2.00  2.00  2.00  0.0   0.0   0.0   0.0
PLAN IN THE FIREPLANNING PROCESS

PROBABILITIES ASSOCIATED WITH THE ABOVE VALUES                             0.80  0.10  0.10  0.0   0.0   0.0   0.0   0.0

PROBABILITY THAT A RANDOM TARGET IS A                                      0.40  0.30  0.30
PREPARATORY TARGET, SCHEDULED TARGET
OR AN ON CALL TARGET

PROBABILITY THAT A RANDOM PREPARATORY TARGET                               0.80  0.10  0.10
IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM SCHEDULED                                        0.60  0.30  0.10
TARGET IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM ON CALL TARGET                                   0.60  0.30  0.10
IS LOCATED ON THE UNIT OBJECTIVE,BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE
```

```
                                            COMPANY DATA

                                         FIREPLANNING STATE 1
                                         --------------------

VALUES FOR NUMBER OF TARGETS UNIT WILL                                        2.00  2.00  2.00  2.00  0.0   0.0   0.0   0.0
PLAN IN THE FIREPLANNING PROCESS

PROBABILITIES ASSOCIATED WITH THE ABOVE VALUES                                0.20  0.20  0.20  0.20  0.05  0.05  0.10  0.0

PROBABILITY THAT A RANDOM TARGET IS A                                         0.10  0.60  0.30
PREPARATORY TARGET, SCHEDULED TARGET
OR AN ON CALL TARGET

PROBABILITY THAT A RANDOM PREPARATORY TARGET                                  0.30  0.60  0.10
IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM SCHEDULED                                           0.10  0.60  0.30
TARGET IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM ON CALL TARGET                                      0.60  0.30  0.20
IS LOCATED ON THE UNIT OBJECTIVE,BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE



                                         FIREPLANNING STATE 2
                                         --------------------

VALUES FOR NUMBER OF TARGETS UNIT WILL                                        2.00  2.00  2.00  2.00  0.0   0.0   0.0   0.0
PLAN IN THE FIREPLANNING PROCESS

PROBABILITIES ASSOCIATED WITH THE ABOVE VALUES                                0.60  0.30  0.10  0.0   0.0   0.0   0.0   0.0

PROBABILITY THAT A RANDOM TARGET IS A                                         0.0   0.20  0.80
PREPARATORY TARGET, SCHEDULED TARGET
OR AN ON CALL TARGET

PROBABILITY THAT A RANDOM PREPARATORY TARGET                                  0.80  0.10  0.10
IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM SCHEDULED                                           0.30  0.50  0.20
TARGET IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE

PROBABILITY THAT A RANDOM ON CALL TARGET                                      0.80  0.20  0.0
IS LOCATED ON THE UNIT OBJECTIVE,BETWEEN THE
LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE
OR BEYOND THE UNIT OBJECTIVE
```

ARTILLERY UNIT PARAMETERS

DESCRIPTION	TYPE OF DISTRIBUTION	MEAN	VARIANCE	LOWER LIMIT	UPPER LIMIT
BATTERY LATERAL DISPLACEMENT ABOUT THE CENTER LINE OF THE SUPPORTED UNIT	TRUNCATED NORMAL	0.0	0.0	SEE NOTES	
BATTERY DEPTH DISPLACEMENT BEHIND THE FRONT LINE OF THE SUPPORTED UNIT	TRUNCATED NORMAL	1000.00	20000.00	SEE NOTES	
MARCH ORDER TIME (SEC)	TRUNCATED NORMAL	600.00	6000.00	400.00	800.00
MOVEMENT RATE(KM/HR)	TRUNCATED NORMAL	20.00	400.00	10.00	30.00
UNIT EMPLACEMENT TIME (SEC)	TRUNCATED NORMAL	360.00	400.00	300.00	420.00
POSITION ERROR COMPONENT	TRUNCATED NORMAL	0.0	9000.00	SEE NOTE	

DISPERSION OF WEAPONS

UNIFORM DISTRIBUTIONS

WEAPON	DEPTH DISPERSION		LATERAL DISPERSION	
	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT
1	10.0	10.0	-50.0	-50.0
2	-10.0	-10.0	-30.0	-30.0
3	10.0	10.0	-10.0	-10.0
4	10.0	10.0	10.0	10.0
5	-10.0	-10.0	30.0	30.0
6	10.0	10.0	50.0	50.0

NOTES

(1) BOUNDS ON LATERAL DISPLACEMENTS ARE THE LATERAL BOUNDARIES OF THE SUPPORTED UNIT

(2) BOUNDS ON THE DEPTH DISPLACEMENT ARE THE FRONT LINE AND A POINT MAX RANGE BEHIND THE FRONT LINE

(3) LATERAL BOUNDS ON THE ERROR COMPONENT ARE FUNCTIONS OF THE BOUNDS IN (1) AND (2) ABOVE

(4) DISTANCE MEASURES ARE IN METERS

(5) TIME MEASURES ARE IN SECONDS

DESCRIPTION	TYPE OF DISTRIBUTION	MEAN	VARIANCE	LOWER LIMIT	UPPER LIMIT
TIME FOR THE FO TO PREPARE THE FIRE MISSION FOR A TARGET OF OPPORTUNITY	TRUNCATED NORMAL	50.00	500.00	25.00	75.00
TIME FOR THE FO TO TRANSMIT THE REQUEST FOR FIRE TO THE FDC	TRUNCATED NORMAL	30.00	500.00	15.00	45.00
TIME REQUIRED TO CONDUCT THE ANALYSIS OF THE TARGET	TRUNCATED NORMAL	60.00	500.00	50.00	70.00
TIME REQUIRED FOR THE ADJUSTING UNIT TO PREPARE AND FIRE A VOLLEY IN THE ADJUSTMENT	TRUNCATED NORMAL	25.00	500.00	20.00	35.00
TIME FOR THE FO TO MAKE ADJUSTMENT CORRECTIONS AND TRANSMIT THEM TO FDC	TRUNCATED NORMAL	20.00	500.00	15.00	35.00
TIME FOR FDC TO COMPUTE NEW ADJUSTING FIRING DATA AND TRANSMIT IT TO THE ADJUSTING UNIT	TRUNCATED NORMAL	30.00	500.00	15.00	45.00
TIME FOR FDC TO SELECT A MASS POINT IN THE FIRE FOR EFFECT PHASE,COMPUTE THE DATA, AND TRANSMIT IT TO THE FIRING UNITS	TRUNCATED NORMAL	30.00	500.00	20.00	40.00
TIME REQUIRED FOR A FIRING UNIT TO PREPARE AND FIRE A VOLLEY IN FIRE FOR EFFECT WHEN THE DATA IS DIFFERENT FROM THAT USED IN THE PREVIOUS VOLLEY	TRUNCATED NORMAL	60.00	300.00	50.00	70.00
TIME REQUIRED FOR A FIRING UNIT TO PREPARE AND FIRE A VOLLEY IN FIRE FOR EFFECT WHEN THE FIRING DATA IS UNCHANGED	TRUNCATED NORMAL	15.00	0.0	15.00	15.00
TIME FOR THE REINFORCING UNIT TO SHOOT A TARGET OF OPPORTUNITY MISSION	TRUNCATED NORMAL	1200.00	200.00	1000.00	1400.00
TIME FOR THE REINFORCING UNIT TO SHOOT A SCHEDULED MISSION	TRUNCATED NORMAL	900.00	800.00	700.00	1100.00
TIME FOR REINFORCING UNIT TO SHOOT A PREP MISSION	TRUNCATED NORMAL	300.00	0.0	200.00	400.00

BASIC ERROR PARAMETERS

PARAMETERS FOR LINEAR FUNCTIONS REPRESENTING VARIANCE AS A FUNCTION OF RANGE

DESCRIPTION	INTERCEPT	SLOPE
EASTING COMPONENT OF TARGET LOCATION ERROR	200.0000	0.0300
NORTHING COMPONENT OF TARGET LOCATION ERROR	2000.0000	0.3000
DEFLECTION COMPONENT OF BURST LOCATION ERROR	200.0000	0.0300
RANGE COMPONENT OF BURST LOCATION ERROR	200.0000	0.0300

```
                                        SECTION V
                             TARGET CHARACTERISTIC PARAMETERS

                                   CATEGORY I TARGET

DESCRIPTION                       DISTRIBUTION          LOWER LIMIT         UPPER LIMIT
NUMBER OF TGT ELEMENTS              UNIFORM                 60.                120.
DEPTH OF ZONE 1                     UNIFORM                100.                300.
DEPTH OF ZONE 2                     UNIFORM                100.                300.
DEPTH OF ZONE 3                     UNIFORM                 50.                300.
LATERAL WIDTH                       UNIFORM                300.                300.


                                   CATEGORY II TARGET

DESCRIPTION                       DISTRIBUTION          LOWER LIMIT         UPPER LIMIT
NUMBER OF TGT ELEMENTS              UNIFORM                185.                300.
DEPTH OF ZONE 1                     UNIFORM                 65.                300.
DEPTH OF ZONE 2                     UNIFORM                 65.                300.
DEPTH OF ZONE 3                     UNIFORM                 65.                300.
LATERAL WIDTH                       UNIFORM                400.               1200.
```

```
                                        SECTION VI
                                   ENGAGEMENT STRATEGIES
STRATEGY NUMBER                                                    LENGTH            DEPTH

      1                                                              0.0               0.0
      2                                                            500.00            200.00
      3                                                            400.00            300.00
      4                                                            600.00            200.00
      5                                                            150.00            200.00
      6                                                            195.00            200.00
      7                                                            400.00            325.00
      8                                                             75.00             20.00


                    DISTRIBUTION OF NUMBER OF VOLLEYS IN THE FIRE FOR EFFECT PHASE
                                   FOR A TARGET OF OPPORTUNITY

NUMBER OF VOLLEYS          6.        3.        0.        0.        0.        0.        0.        0.
PROBABILITY              0.20      0.80      0.0       0.0       0.0       0.0       0.0       0.0


                    DISTRIBUTION OF NUMBER OF VOLLEYS IN THE FIRE FOR EFFECT PHASE
                                      FOR A SCHEDULED TARGET

NUMBER OF VOLLEYS          6.        1.        0.        0.        0.        0.        0.        0.
PROBABILITY              0.50      0.50      0.0       0.0       0.0       0.0       0.0       0.0

               PROBABILITY DISTRIBUTION ON THE ATTACK STRATEGIES FOR A TARGET OF OPPORTUNITY

STRATEGY NUMBER        1         2         3         4         5         6         7         8
PROBABILITY           .60       .05       .05       .10       .05       .05       .05       .05

                 PROBABILITY DISTRIBUTION ON THE ATTACK STRATEGIES FOR A SCHEDULED TARGET

STRATEGY NUMBER        1         2         3         4         5         6         7         8
PROBABILITY           .30       .70       .0        .0        .0        .0        .0        .0

NOTES
LENGTH AND WIDTH FOR THE ATTACK STRATEGIES REFER TO THE DIMENSIONS OF THE BOX WHICH IS SUPERIMPOSED OVER THE TARGET AREA
```

SECTION VII

ARTILLERY BALLISTIC DATA

CHARGE 1

RANGE	PER	PFD	TOF
500	3.00	0.0	1.90
1000	5.00	1.00	3.90
1500	6.00	1.00	5.90
2000	8.00	1.00	8.10
2500	10.00	1.00	10.30
3000	12.00	2.00	12.60
3500	15.00	2.00	15.10
4000	17.00	2.00	17.80
4500	20.00	3.00	20.80
5000	24.00	3.00	24.30
5500	27.00	4.00	29.10
6000	1000.00	0.0	0.0
6500	1000.00	0.0	0.0
7000	1000.00	0.0	0.0
7500	1000.00	0.0	0.0
8000	1000.00	0.0	0.0
8500	1000.00	0.0	0.0
9000	10000.00	0.0	0.0
9500	1000.00	0.0	0.0
10000	1000.00	0.0	0.0
10500	1000.00	0.0	0.0
11000	1000.00	0.0	0.0

NOTE: A PER EQUAL TO 1000. INDICATES THE RANGE IS NOT ACHIEVABLE WITH THIS CHARGE

```
                                  CHARGE 2

   RANGE            PER            PED            TOF

     500            4.00           0.0            1.70
    1000            5.00           1.00           3.40
    1500            6.00           1.00           5.20
    2000            8.00           1.00           7.00
    2500            9.00           1.00           8.90
    3000           11.00           2.00          10.80
    3500           13.00           2.00          12.80
    4000           16.00           2.00          15.00
    4500           19.00           3.00          17.20
    5000           21.00           3.00          19.60
    5500           24.00           3.00          22.20
    6000           28.00           4.00          25.10
    6500           32.00           4.00          28.50
    7000           36.00           5.00          33.00
    7500         1000.00           0.0            0.0
    8000         1000.00           0.0            0.0
    8500         1000.00           0.0            0.0
    9000         1000.00           0.0            0.0
    9500         1000.00           0.0            0.0
   10000         1000.00           0.0            0.0
   10500         1000.00           0.0            0.0
   11000         1000.00           0.0            0.0

NOTE: A PER EQUAL TO 1000. INDICATES THE RANGE IS NOT ACHIEVABLE WITH THIS CHARGE
```

```
                                    CHARGE 3

      RANGE                  PER              PED              TOF

        500                  5.00             0.0              1.40
       1000                  5.00             1.00             2.90
       1500                  6.00             1.00             4.50
       2000                  7.00             1.00             6.10
       2500                  8.00             1.00             7.80
       3000                  9.00             2.00             9.50
       3500                 10.00             2.00            11.30
       4000                 11.00             2.00            13.10
       4500                 12.00             3.00            15.00
       5000                 13.00             3.00            17.00
       5500                 15.00             3.00            19.00
       6000                 17.00             4.00            21.20
       6500                 19.00             4.00            23.50
       7000                 21.00             4.00            26.00
       7500                 23.00             5.00            28.70
       8000                 26.00             5.00            31.80
       8500                 28.00             6.00            35.50
       9000                 31.00             7.00            41.40
       9500               1000.00             0.0              0.0
      10000               1000.00             0.0              0.0
      10500               1000.00             0.0              0.0
      11000               1000.00             0.0              0.0

NOTE: A PER EQUAL TO 1000. INDICATES THE RANGE IS NOT ACHIEVABLE WITH THIS CHARGE
```

```
                                   CHARGE 4

  RANGE                PER              PED             TOF

    500               9.00             0.0             1.10
   1000               8.00             1.00            2.30
   1500               8.00             1.00            3.60
   2000               8.00             1.00            4.90
   2500               8.00             1.00            6.40
   3000               9.00             2.00            8.00
   3500              10.00             2.00            9.60
   4000              10.00             2.00           11.20
   4500              11.00             3.00           12.90
   5000              11.00             3.00           14.70
   5500              12.00             3.00           16.50
   6000              13.00             4.00           18.40
   6500              13.00             4.00           20.40
   7000              14.00             4.00           22.40
   7500              14.00             5.00           24.50
   8000              15.00             5.00           26.70
   8500              15.00             5.00           29.10
   9000              17.00             6.00           31.70
   9500              18.00             6.00           34.50
  10000              19.00             7.00           37.70
  10500              20.00             7.00           41.60
  11000              21.00             9.00           48.40

NOTE: A PER EQUAL TO 1000. INDICATES THE RANGE IS NOT ACHIEVABLE WITH THIS CHARGE
```

LETHALITY FUNCTION

```
     MISS DISTANCE                     PROBABILITY OF BECOMING A CASUALTY

              2.                                .9985387
              4.                                .9941676
              6.                                .9869249
              8.                                .9768737
             10.                                .9641010
             12.                                .9487165
             14.                                .9308510
             16.                                .9105546
             18.                                .8882946
             20.                                .8639531
             22.                                .8378245
             24.                                .8101134
             26.                                .7810311
             28.                                .7507938
             30.                                .7196193
             32.                                .6877249
             34.                                .6553247
             36.                                .6226271
             38.                                .5898335
             40.                                .5571352
             50.                                .4009252
             60.                                .2681707
             70.                                .1667264
             80.                                .0963479
             90.                                .0517518
            100.                                .0258377
            110.                                .0119902
            120.                                .0051718
            130.                                .0020735
            140.                                .0007727
            150.                                .0002677
            160.                                .0000862
            170.                                .0000258
            180.                                .0000072
            190.                                .0000017
            200.                                .0000004
            210.                                .0000001
            220.                                .0000000
            230.                                .0000000
            240.                                .0000000
            250.                                .0000000
            260.                                .0000000
            270.                                .0000000
            280.                                .0000000
            290.                                .0000000
            300.                                .0000000
NOTE: VALUES ARE BASED ON LETHALITY PARAMETER OF     52.300
```

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                              PART II
                     INITIAL UNIT DISPOSITIONS
                             SECTION I
                        MANEUVER ELEMENTS

                              BRIGADE


                          UNIT BOUNDARIES

          LEFT                                              RIGHT

          0.0    EAST                                       11808.438 NORTH

                           OBJECTIVE DATA

       DESCRIPTION                   EAST                   NORTH
 OBJECTIVE CENTER                    5834.29                29676.78
 LENGTH OF MAJOR AXIS                2483.13   METERS
 LENGTH OF MINOR AXIS                1282.64   METERS

                        FIREPLANNING CENTER
            EAST                                   NORTH

           5904.212                                  0.0
```

```
                                   BATTALION 5


                                 UNIT BOUNDARIES

          LEFT                                                         RIGHT

         0.0   EAST                                               6043.207 NORTH

                                  OBJECTIVE DATA

        DESCRIPTION                  EAST                              NORTH
   OBJECTIVE CENTER                 3292.82                            9881.28
   LENGTH OF MAJOR AXIS             1025.98  METERS
   LENGTH OF MINOR AXIS              707.08  METERS

                               FIREPLANNING CENTER
              EAST                                         NORTH

            3021.604                                        0.0
```

```
                              BATTALION 6


                            UNIT BOUNDARIES

        LEFT                                                        RIGHT

      6043.207 EAST                                           11808.438 NORTH

                             OBJECTIVE DATA

      DESCRIPTION                  EAST                             NORTH
OBJECTIVE CENTER                 8931.44                           10259.00
LENGTH OF MAJOR AXIS             1037.20   METERS
LENGTH OF MINOR AXIS              844.31   METERS


                           FIREPLANNING CENTER
            EAST                                         NORTH

          8925.820                                        0.0
```

```
                                 UNIT BOUNDARIES

      LEFT                                                                 RIGHT

     0.0   EAST                                                     2904.865 NORTH

                                  OBJECTIVE DATA

         DESCRIPTION                      EAST                             NORTH
  OBJECTIVE CENTER                       1455.02                            6210.36
  LENGTH OF MAJOR AXIS                    545.90  METERS
  LENGTH OF MINOR AXIS                    241.96  METERS

                                FIREPLANNING CENTER
            EAST                                                  NORTH

          1452.432                                                 0.0
```

```
                              COMPANY 2

                           UNIT BOUNDARIES

     LEFT                                                  RIGHT

   2904.865 EAST                                       6043.207 NORTH

                           OBJECTIVE DATA

   DESCRIPTION                   EAST                      NORTH
OBJECTIVE CENTER                4697.77                    6115.25
LENGTH OF MAJOR AXIS             364.20  METERS
LENGTH OF MINOR AXIS             243.93  METERS

                         FIREPLANNING CENTER
          EAST                                 NORTH
                                                 .
        4474.035                                 0.0
```

```
                                   COMPANY 3

                                UNIT BOUNDARIES

        LEFT                                                          RIGHT

    6043.207 EAST                                                 9008.813 NORTH

                                OBJECTIVE DATA

     DESCRIPTION                    EAST                              NORTH
OBJECTIVE CENTER                  7641.54                            5890.23
LENGTH OF MAJOR AXIS               529.61  METERS
LENGTH OF MINOR AXIS               291.91  METERS

                              FIREPLANNING CENTER
            EAST                                           NORTH

          7526.008                                           0.0
```

```
                                 COMPANY 4

                              UNIT BOUNDARIES

          LEFT                                                    RIGHT

        9008.813 EAST                                         11808.438 NORTH

                              OBJECTIVE DATA

        DESCRIPTION                  EAST                         NORTH
   OBJECTIVE CENTER                10279.54                        6096.07
   LENGTH OF MAJOR AXIS              546.65   METERS
   LENGTH OF MINOR AXIS              243.74   METERS

                            FIREPLANNING CENTER
               EAST                                   NORTH

             10408.625                                 0.0
```

```
                                 BATTERY 1


ACTUAL BATTERY CENTER                 3065.65  EAST          -892.71  NORTH
ASSIGNED BATTERY CENTER               3021.60  EAST          -872.51  NORTH
POSITION ERROR                         -44.05  EAST            20.19  NORTH
AZIMUTH OF LAY                         543.40  MILS

                                WEAPON LOCATIONS
              WEAPON                 EAST                     NORTH

                1                   3017.51                  -909.51
                2                   3044.90                  -916.57
                3                   3051.96                  -889.18
                4                   3069.18                  -879.01
                5                   3096.57                  -896.07
                6                   3103.63                  -858.63
```

```
                                   BATTERY 2


ACTUAL BATTERY CENTER                     5805.43  EAST              -1021.38  NORTH
ASSIGNED BATTERY CENTER                   5904.22  EAST              -1032.93  NORTH
POSITION ERROR                              98.79  EAST                -11.55  NORTH
AZIMUTH OF LAY                             108.94  MILS

                                  WEAPON LOCATIONS
                   WEAPON             EAST                           NORTH
                     1              5754.65                        -1016.77
                     2              5776.67                        -1034.52
                     3              5794.42                        -1012.50
                     4              5814.31                        -1010.37
                     5              5836.33                        -1028.12
                     6              5854.08                        -1006.10
```

```
                              BATTERY 3


ACTUAL BATTERY CENTER               8937.07  EAST          -1011.99  NORTH
ASSIGNED BATTERY CENTER             8925.82  EAST          -1024.79  NORTH
POSITION ERROR                        -11.25  EAST            -12.80  NORTH
AZIMUTH OF LAY                      6030.23  MILS

                            WEAPON LOCATIONS
              WEAPON          EAST                    NORTH

                1            8893.96                 -984.75
                2            8905.49                -1010.59
                3            8931.31                 -999.07
                4            8949.93                -1006.23
                5            8961.50                -1032.06
                6            8937.34                -1020.54
```

PART III

INITIAL FIRE PLAN

LINE NUMBER	TARGET NUMBER	ORIG UNIT	TYPE TARGET	TARGET LOCATION EAST	TARGET LOCATION NORTH	UNIT SCHD	TIME SCHD
0	1.	1.	ON CALL	1700.93	6096.05	0.0	
1	2.	1.	SCHD	972.83	5109.10	1.00	9196.38
2	3.	3.	ON CALL	7533.23	6095.43	0.0	
3	4.	3.	SCHD	7395.24	6923.73	3.00	12462.73
4	5.	4.	SCHD	11437.48	6340.59	3.00	11413.07
5	6.	4.	PREP	10355.20	227.92	1.00	-180.00
6	8.	5.	SCHD	3718.81	9687.38	1.00	17437.29
7	9.	6.	ON CALL	11674.23	29.79	0.0	
8	10.	6.	SCHD	8547.01	9958.55	3.00	17925.39

EVENT VECTOR LISTING

```
 -240.000      1.000      6.000      6.000      0.0    10355.199    227.920      4.000      1.000      0.0
    0.0        0.0        0.0        0.0        0.0        1.000      1.000      0.0        0.0        0.0
    2.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0    10355.199    227.920      0.0        0.0    10355.199    227.920      0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

 -180.000      2.000      6.000      6.000    100.000  10355.199    227.920      4.000      1.000      6.000
    0.0        0.0        0.0        0.0        0.0        1.000      1.000      0.0        0.0        0.0
    2.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0    10355.199    227.920      1.000      0.0    10355.199    227.920      1.000      0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

 -155.350      3.000      6.000      6.000    100.000  10355.199    227.920      4.000      1.000      6.000
    0.0        0.0        0.0        0.0        0.0        1.000      1.000      0.0        0.0        0.0
    2.000      0.0        0.0        0.0        0.0       98.030     60.520     23.140     11.670      4.500
    0.500  10355.199    227.920      1.000      6.000  10355.199    227.920      1.000      0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

    0.0       14.000      7.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

  400.000      7.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

  660.000      8.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

 1200.000      7.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

 1560.000      8.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

 1800.000      7.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

 1980.000     13.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

 2400.000      7.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000

 2450.000      8.000      0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0
    0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        1.000
```

```
3000.000     7.000     0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      1.000

3000.000    13.000     0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      1.000

3200.500     7.000     0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      1.000

3201.500    12.000     0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      1.000

3282.090     1.000    13.000    6.000    1.000 3425.590 2996.600    2.000    0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      1.000  193.000 3201.500    0.0
   1.000     0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0   3417.420 2984.380    0.0      0.0      0.0
3425.590  2996.600    -1.150    0.0      0.0      0.0      0.0      0.0      0.0      1.000

3360.000     8.000     0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      1.000

3368.770     2.000    13.000    6.000    1.000 3425.590 2996.600    2.000    2.000    0.0
   2.000     0.0       0.0      0.0      0.0      0.0      1.000  193.000 3201.500    0.0
   1.000     0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      2.000    0.0   3417.420 2984.380    1.000    1.000    1.000
3425.590  2996.600    -1.150    0.0      0.0      0.0      0.0      0.0      0.0      1.000

3390.420     3.000    13.000    6.000    1.000 3425.590 2996.600    2.000    2.000    0.0
   2.000     0.0       0.0      0.0      0.0      0.0      1.000  193.000 3201.500    0.0
   1.000     0.0       0.0      0.0      0.0     50.020   60.520   92.880    2.000    4.500
   6.000     0.0       0.0      2.000    2.000 3417.420 2984.380    1.000    1.000    1.000
3425.590  2996.600    -1.150    0.0      0.0      0.0      0.0      0.0      0.0      1.000

3491.220     2.000    13.000    6.000    1.000 3607.800 2914.140    2.000    2.000    0.0
   2.000     0.0      31.000    0.0      0.0      0.0      1.000  193.000 3201.500    0.0
   1.000     0.0       0.0      0.0      0.0     50.020   60.520   92.880    2.000    4.500
   8.000     0.0       0.0      2.000    2.000 3417.420 2984.380    1.000    1.000    1.000
3425.590  2996.600    -1.150    0.0      0.0      0.0      0.0      0.0      0.0      1.000

3502.090     3.000    13.000    6.000    1.000 3607.800 2914.140    2.000    2.000    0.0
   2.000     0.0      31.000    0.0      0.0      0.0      1.000  193.000 3201.500    0.0
   1.000     0.0       0.0      0.0      0.0     50.020   60.520   87.620    2.000    4.500
   6.000     0.0       0.0      2.000    4.000 3417.420 2984.380    1.000    1.000    1.000
3425.590  2996.600    -1.150    0.0      0.0      0.0      0.0      0.0      0.0      1.000

3580.560     2.000    13.000    6.000    1.000 3425.590 2996.600    2.000    2.000    0.0
   2.000     0.0      33.000    0.0      0.0      0.0      1.000  193.000 3201.500    0.0
   1.000     0.0       0.0      0.0      0.0     50.020   60.520   87.620    2.000    4.500
   8.000     0.0       0.0      2.000    4.000 3417.420 2984.380    1.000    1.000    1.000
3425.590  2996.600    -1.150    0.0      0.0      0.0      0.0      0.0      0.0      1.000

3600.000     7.000     0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      0.0
   0.0       0.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0      1.000
```

```
3602.210     3.000    13.000     6.000     1.000  3425.590  2996.600     2.000     2.000     0.0
   2.000     0.0      33.000     0.0       0.0       0.0       1.000   193.000  3201.500     0.0
   1.000     0.0       0.0       0.0       0.0      50.020    60.520    92.880     2.000     4.500
   8.000     0.0       0.0       2.000     6.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

3568.450     2.000    13.000     6.000     1.000  3607.800  2914.140     2.000     2.000     0.0
   2.000     0.0      44.000     0.0       0.0       0.0       1.000   193.000  3201.500     0.0
   1.000     0.0       0.0       0.0       0.0      50.020    60.520    92.880     2.000     4.500
   8.000     0.0       0.0       2.000     6.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

3689.320     3.000    13.000     6.000     1.000  3607.800  2914.140     2.000     2.000     0.0
   2.000     0.0      44.000     0.0       0.0       0.0       1.000   193.000  3201.500     0.0
   1.000     0.0       0.0       0.0       0.0      50.020    60.520    87.620     2.000     4.500
   8.000     0.0       0.0       2.000     3.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

3759.090     2.000    13.000     6.000     1.000  3516.700  2955.370     2.000     2.000     0.0
   2.000     0.0      47.000     0.0       0.0       0.0       1.000   193.000  3201.500     0.0
   1.000     0.0       0.0       0.0       0.0      50.020    60.520    87.620     2.000     4.500
   8.000     0.0       0.0       2.000     8.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

3780.350     3.000    13.000     6.000     1.000  3516.700  2955.370     2.000     2.000     0.0
   2.000     0.0      47.000     0.0       0.0       0.0       1.000   193.000  3201.500     0.0
   1.000     0.0       0.0       0.0       0.0      50.020    60.520    90.230     2.000     4.500
   8.000     0.0       0.0       2.000    10.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

3897.780     2.000    13.000     6.000     1.000  3516.700  2955.370     2.000     2.000     6.000
   6.000     6.000    60.000     0.0       0.0       1.000     1.000   193.000  3201.500     0.0
   1.000     3.000     3.000     3.000     1.000    50.020    60.520    90.230     2.000     4.500
   8.000  3516.700  2955.370     2.000    10.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

3913.040     2.000    13.000     6.000     1.000  3516.700  2955.370     2.000     2.000     6.000
   6.000     6.000    60.000     0.0       0.0       1.000     1.000   193.000  3201.500     0.0
   1.000     2.000     2.000     2.000     1.000    50.020    60.520    90.230     2.000     4.500
   8.000  3516.700  2955.370     2.000    28.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

3934.040     2.000    13.000     6.000     1.000  3516.700  2955.370     2.000     2.000     6.000
   6.000     6.000    87.000     0.0       0.0       1.000     1.000   193.000  3201.500     0.0
   1.000     2.000     2.000     2.000     1.000    50.020    60.520    90.230     2.000     4.500
   8.000  3516.700  2955.370     2.000    28.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

3955.300     3.000    13.000     6.000     1.000  3516.700  2955.370     2.000     2.000     6.000
   6.000     6.000    87.000     0.0       0.0       1.000     1.000   193.000  3201.500     0.0
   1.000     1.000     1.000     1.000     1.000    50.020    60.520    90.230     2.000     4.500
   8.000  3516.700  2955.370     2.000    46.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

3970.300     2.000    13.000     6.000     1.000  3516.700  2955.370     2.000     2.000     6.000
   6.000     6.000   101.000     0.0       0.0       1.000     1.000   193.000  3201.500     0.0
   1.000     1.000     1.000     1.000     1.000    50.020    60.520    90.230     2.000     4.500
   8.000  3516.700  2955.370     2.000    46.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

3991.560     3.000    13.000     6.000     1.000  3516.700  2955.370     2.000     2.000     6.000
   6.000     6.000   101.000     0.0       0.0       1.000     1.000   193.000  3201.500     0.0
   1.000     0.0       0.0       0.0       1.000    50.020    60.520    90.230     2.000     4.500
   8.000  3516.700  2955.370     2.000    64.000  3417.420  2984.380     1.000     1.000     1.000
3425.590  2996.600    -1.150     0.0       0.0       0.0       0.0       0.0       0.0       1.000

4200.000     7.000     0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0
   0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0
   0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0
   0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0
   0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       1.000
```

```
TARGET NUMBER                              13.00
LOCATION                                 3417.42  EAST          2984.38  NORTH
FO ERROR                                   -8.19  EASTING        -12.22NORTHING
TARGET CATEGORY                             2.00
LATERAL LENGTH                            439.90  METERS
DEPTH                                     198.61  METERS
NUMBER OF TARGET ELEMENTS                 193.00
TARGET DENSITY                        0.0
TIME GENERATED                           3201.50
UNIT BEING SUPPORTED                        2.00
ADJUSTING UNIT                              2.00
INITIAL ENGAGEMENT RANGE                 4730.83  METERS
NUMBER OF VOLLEYS IN ADJUSTMENT             5.00
STRATEGY USED IN FFE                        1.00
NUMBER OF VOLLEYS IN FFE                    3.00
TOTAL ROUNDS FIRED ON TARGET               64.00
NUMBER OF CASUALTIES INFLICTED            101.00
PERCENT CASUALTIES INFLICTED                0.52
ROUNDS/CASUALTY                             0.63
TOTAL ENGAGEMENT TIME                     790.07  SECONDS
KILL RATE                                  0.130  CASUALTIES/SECOND


TARGET NUMBER                               2.00
LOCATION                                 7532.23  EAST          6095.43  NORTH
FO ERROR                                    0.0   EASTING          0.0 NORTHING
TARGET CATEGORY                             1.00
LATERAL LENGTH                            262.27  METERS
DEPTH                                     249.05  METERS
NUMBER OF TARGET ELEMENTS                  62.00
TARGET DENSITY                        0.0
TIME GENERATED                          10517.61
UNIT BEING SUPPORTED                        3.00
ADJUSTING UNIT                              2.00
INITIAL ENGAGEMENT RANGE                 7312.13  METERS
NUMBER OF VOLLEYS IN ADJUSTMENT             2.00
STRATEGY USED IN FFE                        4.00
NUMBER OF VOLLEYS IN FFE                    3.00
TOTAL ROUNDS FIRED ON TARGET               58.00
NUMBER OF CASUALTIES INFLICTED             49.00
PERCENT CASUALTIES INFLICTED                0.79
ROUNDS/CASUALTY                             1.18
TOTAL ENGAGEMENT TIME                     619.37  SECONDS
KILL RATE                                  0.080  CASUALTIES/SECOND
```

```
TARGET NUMBER                      6.00
TARGET TYPE                        0.0    SCHD        1.00PREP
UNIT ORIGINATING                   4.00
TIME SCHEDULED                  -180.00
TIME FIRED                      -240.00
UNIT FIRED                         1.00
STRATEGY USED                      1.00
NUMBER OF VOLLEYS IN FFE           1.00
TOTAL ROUNDS FIRED                 6.00
TOTAL TARGET ELEMENTS              0.0
TOTAL CASUALTIES INFLICTED         0.0


TARGET NUMBER                      1.00
TARGET TYPE                        1.00   SCHD        0.0 PREP
UNIT ORIGINATING                   1.00
TIME SCHEDULED                     0.0
TIME FIRED                      7546.89
UNIT FIRED                         1.00
STRATEGY USED                      1.00
NUMBER OF VOLLEYS IN FFE           6.00
TOTAL ROUNDS FIRED                36.00
TOTAL TARGET ELEMENTS              0.0
TOTAL CASUALTIES INFLICTED         0.0


TARGET NUMBER                      5.00
TARGET TYPE                        1.00   SCHD        0.0 PREP
UNIT ORIGINATING                   4.00
TIME SCHEDULED                 11413.07
TIME FIRED                     11353.07
UNIT FIRED                         3.00
STRATEGY USED                      2.00
NUMBER OF VOLLEYS IN FFE           1.00
TOTAL ROUNDS FIRED                 6.00
TOTAL TARGET ELEMENTS              0.0
TOTAL CASUALTIES INFLICTED         0.0


TARGET NUMBER                      4.00
TARGET TYPE                        1.00   SCHD        0.0 PREP
UNIT ORIGINATING                   3.00
TIME SCHEDULED                 12462.73
TIME FIRED                     12402.73
UNIT FIRED                         3.00
STRATEGY USED                      1.00
NUMBER OF VOLLEYS IN FFE           6.00
TOTAL ROUNDS FIRED                36.00
TOTAL TARGET ELEMENTS            210.00
TOTAL CASUALTIES INFLICTED        95.00
```

REINFORCING UNIT TARGETS

```
TARGET NUMBER                         34.00
TARGET TYPE                            0.0   SCHD        0.0   PREP        1.00  TGT OPP
UNIT SCHEDULED TO FIRE               100.00
TIME SCHEDULED OR ORIGINATED       37535.07
TIME FIRED                         37607.99
TOTAL ENGAGEMENT TIME               1199.14

TARGET NUMBER                         21.00
TARGET TYPE                            1.00  SCHD        0.0   PREP        0.0   TGT OPP
UNIT SCHEDULED TO FIRE               100.00
TIME SCHEDULED OR ORIGINATED           0.0
TIME FIRED                         39105.32
TOTAL ENGAGEMENT TIME                997.06

TARGET NUMBER                         44.00
TARGET TYPE                            0.0   SCHD        1.00  PREP        0.0   TGT OPP
UNIT SCHEDULED TO FIRE               100.00
TIME SCHEDULED OR ORIGINATED           0.0
TIME FIRED                         40737.42
TOTAL ENGAGEMENT TIME                300.00

TARGET NUMBER                         41.00
TARGET TYPE                            0.0   SCHD        1.00  PREP        0.0   TGT OPP
UNIT SCHEDULED TO FIRE               100.00
TIME SCHEDULED OR ORIGINATED           0.0
TIME FIRED                         41097.42
TOTAL ENGAGEMENT TIME                300.00

TARGET NUMBER                         38.00
TARGET TYPE                            1.00  SCHD        0.0   PREP        0.0   TGT OPP
UNIT SCHEDULED TO FIRE               100.00
TIME SCHEDULED OR ORIGINATED           0.0
TIME FIRED                         49697.19
TOTAL ENGAGEMENT TIME                906.19
```

```
                                        SUMMARY DATA

AVERAGE QUEUE LENGTH BY QUEUE
                  1                     2                     3                     4
              0.0007144             0.0061912             0.0                   0.0
AVERAGE TIME TARGET IN QUEUE(BY QUEUE)
                  1                     2                     3                     4
                 63.13                 175.11                 0.0                   0.0
AVERAGE KILL RATE FOR A TARGET                                0.1278993  CASUALTIES/SECOND OF ENGAGEMENT TIME
OF OPPORTUNITY

AVERAGE ROUNDS / CASUALTY FOR                                 0.498486   ROUNDS / CASUALTY
TARGET OF OPPORTUNITY
```

APPENDIX D

Event Vector Guide

The model event chain resides in the array EVLIST which is dimensioned 250x50. Each time a requirement for some future event is generated, an event vector is initialized. Each time the next event in time is selected from the EVLIST array, the vector is stored temporarily as the row vector CEVENT. This appendix describes the relevent storage locations for each of the type events in the model. Tabs to this appendix describe the event vector location descriptions according to the scheme below:

Tab	Description
1	Target Analysis Shooting Event Damage Assessment
2	Tactical Situation Update Current Artillery Position Evaluation Target of Opportunity Generation On-Call Target Conversion Queue Checking Event Storage Maintenance
3	Weapon Positioning Fireplanning Event Fire Allocation Reinitialize Unit Status Flags Disengage a Maneuver Element

Tab 1

APPENDIX D

Target Analysis
Shooting Event
Damage Assessment

The storage locations in the event vector are identified as follows for the above events:

Storage Location	Description
1	Time the event will take place.
2	Routine code.
3	Target number of the target in question.
4	Row in the target history array (TGT) where the target information is being stored.
5	Row in the target description array where position information on the target elements is stored.
6	Easting component of the reported target location.
7	Northing component of the reported target location.
8	Maneuver element being supported.
9	Artillery unit scheduled to fire.
10	Number of rounds that Battery 1 will fire on the next volley.
11	Number of rounds that Battery 2 will fire on the next volley.
12	Number of rounds that Battery 3 will fire on the next volley.

13	Number of casualties inflicted.
14	Time the mission was terminated.
15	Time for the maneuver element to become disengaged.
16	Adjustment completion code. This entry is 1 if no adjustment is taking place or if the adjustment is completed. If these are not the case, the value is 0.
17	Initial fire request code. If the request is an initial request, this entry is 1. If not, the entry is 0.
18	Number of target elements in the target complex.
19	The time the engagement was initiated.
20	Open Storage.
21	Priority of the target.
22	Number of volleys remaining for Battery 1 to fire.
23	Number of volleys remaining for Battery 2 to fire.
24	Number of volleys remaining for Battery 3 to fire.
25	Strategy identifier for the strategy to be used in fire for effect phase.
26	Variance of the distribution of range error for Battery 1.
27	Variance of the distribution of range error for Battery 2.
28	Variance of the distribution of range error for Battery 3.
29	Variance of the distribution of deflection error for Battery 1

30	Variance of the distribution of deflection error for Battery 2.
31	Variance of the distribution of deflection error for Battery 3.
32	Easting coordinate of the initial fire for effect aimpoint.
33	Northing coordinate of the initial fire for effect aimpoint.
34	Principal artillery unit involved in the mission.
35	Cumulative rounds fired on the target.
36	Easting coordinate of the actual target location.
37	Northing coordinate of the actual target location.
38	If Battery 1 is committed to the mission, this entry is 1. Otherwise, the entry is 0.
39	If Battery 2 is committed to the mission, this entry is 1. Otherwise, the entry is 0.
40	If Battery 3 is committed to the mission, this entry is 1. Otherwise, the entry is 0.

Tab 2

APPENDIX D

Tactical Situation Update
Current Artillery Position Evaluation
Target of Opportunity Generation
On-Call Target Conversion
Queue Checking Event
Storage Maintenance

For the above events, the storage locations in the CEVENT vector have the following significance:

Storage Location	Description
1	Time the event will take place.
2	Routing code appropriate to the particular event. The routing code corresponds to the IKEY variable in the main program.

Tab 3

APPENDIX D

Weapon Positioning
Fireplanning Event
Fire Allocation
Reinitialize Unit Status Flag
Disengage a Maneuver Element

The storage locations in the CEVENT vector have the following descriptions for the above events:

Storage Location	Description
1	Time the event will take place.
2	Routing code.
3	Specific unit involved.
4	Has significance only for the fire allocation event and specifies the time for reinitialization of the attack.

APPENDIX E

Computer Program

This appendix contains the complete program to include the necessary job control cards for the IBM 360 computer. The programming language used is FORTRAN IV.

The program contains all the subroutines necessary for random number generation. The pseudorandom numbers used in the program are generated using a congruential method. The routine which generates the random numbers is the UGEN routine. Normal variates are generated by the NGEN routine and the truncated normal variates are generated by the TNGEN routine. The exponential variates are generated by the EXPON routine. The methods used to generate the standard normal, exponential, and uniform variates are as described by Naylor (1). Truncated normal variates are generated using a rejection technique. Under this method, variates are generated until one falls within the limits defined for the variable. All numbers generated prior to the selected number are discarded.

The random number generator, UGEN, is initialized by specifying a seed, NU, which is an input parameter to the program. Any positive number can be selected for NU. The characteristics of mixed congruential generators are such that only through empirical testing can one have confidence in the statistical properties of sequences generated by this method.

JOB CONTROL SECTION

```
//    EXEC   FORTCLG,TIME.FORT=2,TIME.LINK=2,REGION.GO=370K,TIME.GO=10
//FORT.SYSPRINT DD SPACE=(CYL,(9,1))
//FORT.SYSIN DD *
/
C
C      ARTILLERY FIRE SUPPORT SIMULATION MODEL
C
C      MAIN PROGRAM
C
       COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN
       COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,
     2XTLETH ,STAT(20,4)
C
C      READ IN THE MODEL PARAMETERS
C
       CALL RDPAR
C
C      GENERATE THE INITIAL TACTICAL SITUATION
C
       CALL SETUP
1000   DO 999 I=1,50
999    CEVENT(I)= 0.0
C
C      LOCATE THE CURRENT EVENT AND RECORD THE EVENT IN OFFLINE STORAGE
C
       CALL TNE
       IF(CEVENT(2) .EQ. 6) GO TO 1500
       CALL WEVENT
1500   CONTINUE
       CTIME=CEVENT(1)
       IKEY= CEVENT(2)
       GO TO (1,2,3,4,5,6,7,8,9,10,11,12,13,14,15),IKEY
C
C      CONDUCT ANALYSIS OF TARGET
C
1      CALL TOANAL
       GO TO 1000
C
C      DETERMINE THE FIRING PARAMETERS
C
2      CALL SHOOT
       GO TO 1000
C
C      ASSESS DAMAGE TO THE TARGET
```

```
C                                                                       MA 00430
3     CALL DAMAGE                                                       MA 00440
      GO TO 1000                                                        MA 00450
C                                                                       MA 00460
C                                                                       MA 00470
C     CHECK THE QUEUES FOR TARGETS ON HOLD STATUS                       MA 00480
C                                                                       MA 00490
4     CALL CKQUE                                                        MA 00500
      GO TO 1000                                                        MA 00510
C                                                                       MA 00520
C     INTERJECT AN ON CALL TARGET                                       MA 00530
C                                                                       MA 00540
5     CALL CONV                                                         MA 00550
      GO TO 1000                                                        MA 00560
C                                                                       MA 00570
C     GATHER THE QUEUE STATISTICS                                       MA 00580
C                                                                       MA 00590
6     CALL ASTAT                                                        MA 00600
      GO TO 1000                                                        MA 00610
C                                                                       MA 00620
C     UPDATE THE TACTICAL SITUATION                                     MA 00630
C                                                                       MA 00640
7     CALL DECIS(RMODE)                                                 MA 00650
      IF (RMODE .EQ. 1) GO TO 2000                                      MA 00660
      GO TO 1000                                                        MA 00670
C                                                                       MA 00680
C     DETERMINE IF ANY ARTILLERY UNITS SHOULD MOVE                      MA 00690
C                                                                       MA 00700
8     CALL MOARTY                                                       MA 00710
      GO TO 1000                                                        MA 00720
C                                                                       MA 00730
C     MOVE SPECIFIED ARTILLERY UNIT                                     MA 00740
C                                                                       MA 00750
9     NUNIT= CEVENT(3)                                                  MA 00760
      CALL WPLOC(NUNIT)                                                 MA 00770
      GO TO 1000                                                        MA 00780
C                                                                       MA 00790
C     SPECIFIED UNIT CONDUCTS FIRE PLANNING                             MA 00800
C                                                                       MA 00810
10    NUNIT= CEVENT(3)                                                  MA 00820
      CALL FIPLAN(NUNIT)                                                MA 00830
      QHOUR= CEVENT(4)                                                  MA 00840
C                                                                       MA 00850
C     ALLOCATE TARGETS TO FIRE UNITS                                    MA 00860
C                                                                       MA 00870
11    CALL FIALOC(QHOUR)                                                MA 00880
      GO TO 1000                                                        MA 00890
C                                                                       MA 00900
```

```
C     GENERATE A TARGET OF OPPORTUNITY
C
12    CALL TOGEN
      GO TO 1000
C
C     CLEAR STORAGE ARRAYS OF UNNECESSARY INFORMATION
C
13    CALL EXTGT
      GO TO 1000
C
C     REINITIALIZE SPECIFIED UNIT STATUS FLAGS
C
14    NUNIT= CEVENT(3)
      CALL RESET(NUNIT)
      GO TO 1000
C
C     DISENGAGE A MANEUVER ELEMENT
C
15    CALL DISGE
      GO TO 1000
C
C     PRINT OUT FINAL REPORT
C
2000  CALL SUMRY
      STOP
      END


      SUBROUTINE DECIS (RMODE)
C
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,
     2XTLETH ,STAT(20,4)
C
C     UPDATE LOCATIONS OF UNIT FPC'S
C
      CALL MUNIT
C
C     VERIFY STATUS OF EACH UNIT
C
      DO 1000 I=1,7
302   ISTAT= GDATA(I,2)
7000  GO TO (100,200,300,400,500,600,1000,1000,1000),ISTAT
C
C     VERIFY STATE 1
C
```

```
100     CONTINUE                                                          MA 01370
        IF(I .NE. 7) GO TO 1000                                           MA 01380
        RMODE=1.0                                                         MA 01390
        GO TO 7500                                                        MA 01400
C                                                                         MA 01410
C       CURRENT UNIT STATE IS 2, SEE IF SHOULD GO TO STATE 3              MA 01420
C                                                                         MA 01430
200     IF((GDATA(I,8)-GDATA(I,13)) .LE. 1/3.*GDATA(I,19)) GDATA(I,2)=3.0MA 01440
        IF(GDATA(I,2) .EQ. 3.0) GO TO 302                                 MA 01450
        GO TO (201,202,203,204,205,206,1000),I                            MA 01460
201     IS=2                                                              MA 01470
        GO TO 220                                                         MA 01480
202     IS=1                                                              MA 01490
        GO TO 220                                                         MA 01500
203     IS=4                                                              MA 01510
        GO TO 220                                                         MA 01520
204     IS=3                                                              MA 01530
        GO TO 220                                                         MA 01540
205     IS=6                                                              MA 01550
        GO TO 220                                                         MA 01560
206     IS=5                                                              MA 01570
C                                                                         MA 01580
C       CHECK TO SEE IF UNIT SHOULD GO TO ADMIN MOLD                      MA 01590
C                                                                         MA 01600
220     IF((GDATA(I,13)-GDATA(IS,13)) .GE. 1/5.*GDATA(I,19) .AND. GDATA(  MA 01610
     2IS,2) .NE. 8)  GDATA(I,2)= 6.0                                      MA 01620
        GO TO 1000                                                        MA 01630
C                                                                         MA 01640
C       CURRENT UNIT STATE IS 3, SEE IF SHOULD GO TO STATE 4              MA 01650
C                                                                         MA 01660
300     CALL FIX(I,IRES1)                                                 MA 01670
        IF(IRES1 .EQ. 0) GO TO 1000                                       MA 01680
        GDATA(I,2)= 4.0                                                   MA 01690
        GO TO 302                                                         MA 01700
C                                                                         MA 01710
C       CURRENT UNIT STATE IS 4, SEE IF SHOULD BE 5                       MA 01720
C                                                                         MA 01730
400     CALL OBJSEC(I,JRES1)                                              MA 01740
        IF(JRES1 .EQ. 1 .AND. I .EQ. 7) GO TO 100                         MA 01750
        IF(JRES1 .EQ. 0) GO TO 1000                                       MA 01760
        CALL FIOBJ(I,KRES)                                                MA 01770
        IF (KRES .EQ. 0) GO TO 402                                        MA 01780
        IF (KRES .EQ. 1) GO TO 403                                        MA 01790
402     GDATA(I,2)= 5.0                                                   MA 01800
        GO TO 302                                                         MA 01810
403     GDATA(I,2)= 9.0                                                   MA 01820
        GO TO 302                                                         MA 01830
500     GO TO 1000                                                        MA 01840
```

```
C                                                                       MA 01850
C     UNIT IS UNDER ADMIN HOLD, SEE IF SHOULD BE LIFTED                 MA 01860
C                                                                       MA 01870
600   GO TO (601,602,603,604,605,606,1000),I                            MA 01880
601   IS=2                                                              MA 01890
      GO TO 650                                                         MA 01900
602   IS=1                                                              MA 01910
      GO TO 650                                                         MA 01920
603   IS=4                                                              MA 01930
      GO TO 650                                                         MA 01940
604   IS=3                                                              MA 01950
      GO TO 650                                                         MA 01960
605   IS=6                                                              MA 01970
      GO TO 650                                                         MA 01980
606   IS=5                                                              MA 01990
650   IF((GDATA(I,13)-GDATA(IS,13)) .GE. 1/5.*GDATA(I,19) .AND. GDATA(  MA 02000
     2IS,2) .NE. 8) GO TO 1000                                          MA 02010
      GDATA(I,2)= 2.0                                                   MA 02020
      GO TO 302                                                         MA 02030
1000  CONTINUE                                                          MA 02040
C                                                                       MA 02050
C     ASSIGN NEW BATTALION OBJECTIVES IF NECESSARY                      MA 02060
C                                                                       MA 02070
      I1=5                                                              MA 02080
      I2=6                                                              MA 02090
      IU=7                                                              MA 02100
1005  DO 1100 I=I1,I2                                                   MA 02110
      IF(GDATA(I,2) .NE. 5) GO TO 1100                                  MA 02120
      CALL OBJ(I,GDATA(I,2))                                            MA 02130
1100  CONTINUE                                                          MA 02140
C                                                                       MA 02150
C     ASSIGN NEW COMPANY OBJECTIVES IF NECESSARY                        MA 02160
C                                                                       MA 02170
      DO 1200 I=1,4                                                     MA 02180
      IF(GDATA(I,2) .NE. 5) GO TO 1200                                  MA 02190
      IF(I .GT. 2) IU=6                                                 MA 02200
      IF(I .LE. 2) IU=5                                                 MA 02210
      IF(GDATA(IU,2) .EQ. 4) GO TO 1200                                 MA 02220
      CALL OBJ(I, GDATA(I,2))                                           MA 02230
1200  CONTINUE                                                          MA 02240
C                                                                       MA 02250
C     DO FIREPLANNING AND ASSIGN NEW KICKOFF TIMES IF NECESSARY         MA 02260
C                                                                       MA 02270
1300  IF(GDATA(5,2) .EQ. 8 .AND. GDATA(6,2) .EQ. 8) GO TO 4000          MA 02280
      DO 4010 I=5,6                                                     MA 02290
      IF(GDATA(I,2) .NE. 7) GO TO 4010                                  MA 02300
      IF( I .EQ. 5) R1=8.                                               MA 02310
      IF( I .EQ. 6) R1=9.                                               MA 02320
```

```
      R2= I                                                             MA 02330
      CALL UGEN((CTIME+1800),(CTIME+3600),QHOUR)                        MA 02340
      CALL SET(QHOUR,R1,R2)                                             MA 02350
      GDATA(I,2)= 1.0                                                   MA 02360
      IF(I .EQ. 5) GO TO 4005                                           MA 02370
      IN1=3                                                             MA 02380
      IN2=4                                                             MA 02390
      GO TO 4006                                                        MA 02400
 4005 IN1=1                                                             MA 02410
      IN2=2                                                             MA 02420
 4006 DO 4007 IV= IN1,IN2                                               MA 02430
 4007 GDATA(IV,2)= 1.0                                                  MA 02440
 4010 CONTINUE                                                          MA 02450
      DO 4100 I=1,4                                                     MA 02460
      IF(I .EQ. 1) ISIS=2                                               MA 02470
      IF(I .EQ. 2) ISIS=1                                               MA 02480
      IF(I .EQ. 3) ISIS=4                                               MA 02490
      IF( I .EQ. 4) ISIS=3                                              MA 02500
      IF(I .LE. 2) J=5                                                  MA 02510
      IF(I .GT. 2) J=6                                                  MA 02520
      IF(GDATA(J,2) .EQ. 8) GO TO 4100                                  MA 02530
      IF(GDATA(I,2) .EQ. 8 .AND. GDATA(ISIS,2) .EQ. 8) GO TO 4300       MA 02540
      IF(GDATA(I,2) .NE. 7) GO TO 4100                                  MA 02550
      CALL UGEN((CTIME+900),(CTIME+1800),QHOUR)                         MA 02560
      R2=I                                                              MA 02570
      R1=I                                                              MA 02580
 4013 CALL SET(QHOUR,R1,R2)                                             MA 02590
      GDATA(I,2)= 1.0                                                   MA 02600
      GO TO 4100                                                        MA 02610
 4300 CALL UGEN((CTIME+1800),(CTIME+2400),QHOUR)                        MA 02620
      IF(I .EQ. 1 .OR. I .EQ. 2) R1=8.                                  MA 02630
      IF(I .EQ. 3 .OR. I .EQ. 4) R1= 9.                                 MA 02640
      IF( I .EQ. 3 .OR. I .EQ. 4) R2=6.                                 MA 02650
      IF(I .EQ. 1 .OR. I .EQ. 2) R2=5.                                  MA 02660
      GDATA(ISIS,2)= 1.0                                                MA 02670
      GO TO 4013                                                        MA 02680
 4100 CONTINUE                                                          MA 02690
      GO TO 6000                                                        MA 02700
 4000 CALL UGEN((CTIME+2400),(CTIME+4200),QHOUR)                        MA 02710
      R1= 10.                                                           MA 02720
      R2=7.                                                             MA 02730
      CALL SET(QHOUR,R1,R2)                                             MA 02740
      DO 4700 I=1,6                                                     MA 02750
 4700 GDATA(I,2)= 1.0                                                   MA 02760
 6000 RMODE=0.0                                                         MA 02770
      IF(IROW .EQ. 4) GO TO 7600
      EVLIST(IROW,1)= CTIME+600                                         MA 02790
      GO TO 7500                                                        MA 02800
```

```
 7600 EVLIST(IROW,1)= 1000000.                                          MA 02810
 7500 RETURN                                                            MA 02820
      END                                                               MA 02830

      SUBROUTINE MUNIT                                                  MA 02840
C                                                                       MA 02850
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MA 02860
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MA 02870
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MA 02880
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MA 02890
     2XTLETH ,STAT(20,4)                                                MA 02900
C                                                                       MA 02910
C     CHECK TO SEE IF THE BATTALION IS UNDER A HOLD                     MA 02920
C                                                                       MA 02930
      DO 100 I=5,6                                                      MA 02940
      IF (GDATA(I,2) .EQ.6) GO TO 200                                   MA 02950
C                                                                       MA 02960
C     BATTALION IS FREE                                                 MA 02970
C                                                                       MA 02980
      GO TO 105                                                         MA 02990
  100 CONTINUE                                                          MA 03000
      GO TO 300                                                         MA 03010
  105 IF (I.EQ.5) J=1                                                   MA 03020
      IF (I.EQ.6) J=3                                                   MA 03030
      K=J+1                                                             MA 03040
      DO 251 IJ=J,K                                                     MA 03050
      ISTAT= GDATA(IJ,2)                                                MA 03060
  540 IF (GDATA(IJ,16) .EQ. 1) GO TO 250                                MA 03070
      GO TO (250,240,241,250,250,250,250,250,250),ISTAT                 MA 03080
  240 IF (GDATA(IJ,12).GT.GDATA(IJ,17)) GO TO 270                       MA 03090
      CALL UGEN (0.0,1.0472,ANGLE)                                      MA 03100
      GO TO 261                                                         MA 03110
  270 CALL UGEN (0.0,-1.0472,ANGLE)                                     MA 03120
  261 CALL NLOC2(IJ,ANGLE)                                              MA 03130
  250 GDATA(IJ,14)= CTIME                                               MA 03140
  251 CONTINUE                                                          MA 03150
      GO TO 100                                                         MA 03160
  241 CALL NLOC3(IJ)                                                    MA 03170
      GO TO 250                                                         MA 03180
C                                                                       MA 03190
C     BATTALION IS UNDER A HOLD                                         MA 03200
C                                                                       MA 03210
  200 CONTINUE                                                          MA 03220
      IF( I .EQ. 5) J=1                                                 MA 03230
      IF (I.EQ.6) J=3                                                   MA 03240
      K=J+1                                                             MA 03250
      DO 600 IJ=J,K                                                     MA 03260
```

```
      IF (GDATA(IJ,16) .EQ. 1) GO TO 599                                 MA 03270
      ISTAT= GDATA(IJ,2)                                                 MA 03280
      GO TO (599,500,501,599,599,599,599,599),ISTAT                      MA 03290
500   SDIS= GDATA(I,13)-GDATA(IJ,13)                                     MA 03300
      IF (SDIS .GE. 0) GO TO 599                                         MA 03310
      IF (SDIS .GE. -500) GO TO 599                                      MA 03320
      IF (GDATA(IJ,12) .GT. GDATA(IJ,17)) GO TO 620                      MA 03330
      CALL UGEN (0.0,1.0472,ANGLE)                                       MA 03340
      GO TO 621                                                          MA 03350
620   CALL UGEN(0.0,-1.0472,ANGLE)                                       MA 03360
621   CALL NLOC2(IJ,ANGLE)                                               MA 03370
599   GDATA(IJ,14)= CTIME                                                MA 03380
600   CONTINUE                                                           MA 03390
      GO TO 100                                                          MA 03400
501   CALL NLOC3(IJ)                                                     MA 03410
      GO TO 599                                                          MA 03420
C                                                                        MA 03430
C     COMPUTE NEW FIREPLANNING CENTERS                                   MA 03440
C                                                                        MA 03450
300   DO 1200 I=5,6                                                      MA 03460
      IF (I.EQ.5) J=1                                                    MA 03470
      IF (I.EQ.6) J=3                                                    MA 03480
      SUME=0.0                                                           MA 03490
      SUMN=0.0                                                           MA 03500
      K=J+1                                                              MA 03510
      DO 1201 IJ=J,K                                                     MA 03520
      SUME= SUME+GDATA(IJ,12)                                            MA 03530
      SUMN= SUMN+ GDATA(IJ,13)                                           MA 03540
1201  CONTINUE                                                           MA 03550
      GDATA(I,12)= SUME/2                                                MA 03560
      GDATA(I,13)= SUMN/2                                                MA 03570
1200  CONTINUE                                                           MA 03580
C                                                                        MA 03590
C     DO THE BRIGADE NOW                                                 MA 03600
C                                                                        MA 03610
      GDATA(7,12)=(GDATA(5,12)+GDATA(6,12))/2.                           MA 03620
      GDATA(7,13)= (GDATA(5,13)+ GDATA(6,13))/2.                         MA 03630
      RETURN                                                             MA 03640
      END                                                                MA 03650


      SUBROUTINE NLOC2(NUNIT,ANGLE)                                      MA 03660
C                                                                        MA 03670
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,          MA 03680
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),   MA 03690
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                    MA 03700
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,    MA 03710
     2XTLETH ,STAT(20,4)                                                 MA 03720
```

```
C                                                                       MA 03730
C     DETERMINE THE RANDOM RATE OF ADVANCE                              MA 03740
C                                                                       MA 03750
      CALL UGEN(PRDATA(1,NUNIT,16,1),PRDATA(1,NUNIT,16,2),RATE)         MA 03760
      SRATE= 1000.*RATE/3600                                            MA 03770
C                                                                       MA 03780
C     COMPUTE DISTANCE MOVED                                            MA 03790
C                                                                       MA 03800
      DIS= SRATE*(CTIME-GDATA(NUNIT,14))                                MA 03810
C                                                                       MA 03820
C     DETERMINE NEW FIRE PLANNING CENTER                                MA 03830
C                                                                       MA 03840
200   GDATA(NUNIT,12)= GDATA(NUNIT,12)+ DIS*SIN(ANGLE)                  MA 03850
      GDATA(NUNIT,13)= GDATA(NUNIT,13)+ DIS*COS(ANGLE)                  MA 03860
6000  RETURN                                                            MA 03870
      END                                                               MA 03880


      SUBROUTINE NLOC3(NUNIT)                                           MA 03890
C                                                                       MA 03900
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MA 03910
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MA 03920
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MA 03930
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MA 03940
     2XTLETH ,STAT(20,4)                                                MA 03950
C                                                                       MA 03960
C     COMPUTE X AND Y COMPONENTS OF DISTANCE FROM FPC TO UNIT OBJECTIVEMA 03970
C     AND CURRENT DIRECTION TO OBJECTIVE.                               MA 03980
C                                                                       MA 03990
      DISN= GDATA(NUNIT,8)-GDATA(NUNIT,13)                              MA 04000
100   DISE= GDATA(NUNIT,7)-GDATA(NUNIT,12)                              MA 04010
      ARG=DISE/DISN                                                     MA 04020
      ANGLE= ATAN(ARG)                                                  MA 04030
C                                                                       MA 04040
C     DETERMINE RATE OF MOVEMENT AND COMPUTE DISTANCE MOVED             MA 04050
C                                                                       MA 04060
200   CALL UGEN(PRDATA(1,NUNIT,16,1),PRDATA(1,NUNIT,16,2),RATE)         MA 04070
      SRATE= 1000.*RATE/3600                                            MA 04080
      DIS= SRATE*(CTIME-GDATA(NUNIT,14))                                MA 04090
C                                                                       MA 04100
C     DETERMINE NEW FIRE PLANNING CENTER                                MA 04110
C                                                                       MA 04120
      GDATA(NUNIT,12)= GDATA(NUNIT,12)+ DIS*SIN(ANGLE)                  MA 04130
      GDATA(NUNIT,13)= GDATA(NUNIT,13)+DIS*COS(ANGLE)                   MA 04140
6000  RETURN                                                            MA 04150
      END                                                               MA 04160
```

```
      SUBROUTINE FIX(NUNIT,IRES)                                        MB 00010
C                                                                       MB 00020
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MB 00030
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MB 00040
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MB 00050
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MB 00060
     2XTLETH ,STAT(20,4)                                                MB 00070
C                                                                       MB 00080
      IRES=0                                                            MB 00090
      GO TO (400,400,400,400,500,500,700),NUNIT                         MB 00100
      IF (GDATA(NUNIT,2) .EQ. 4.) GO TO 6000                            MB 00110
400   DISE= ABS(GDATA(NUNIT,7)-GDATA(NUNIT,12))                         MB 00120
      DISN= GDATA(NUNIT,8)-GDATA(NUNIT,13)                              MB 00130
      DISOBJ= SQRT(DISE**2+DISN**2)                                     MB 00140
      IF (DISOBJ .LT. 200.OR. GDATA(NUNIT,13) .GT.GDATA(NUNIT,8))       MB 00150
     2IRES= 1                                                           MB 00160
      IF(IRES .NE. 1) GO TO 7000                                        MB 00170
      GDATA(NUNIT,15)= CTIME                                            MB 00180
      GDATA(NUNIT,2)= 4.0                                               MB 00190
      GO TO 7000                                                        MB 00200
500   IF(NUNIT .EQ. 5) J=1                                              MB 00210
      IF(NUNIT.EQ.6) J=3                                                MB 00220
      K=J+1                                                             MB 00230
      DO 1100 IJ=J,K                                                    MB 00240
      IF(GDATA(IJ,20) .NE. 1 .OR. GDATA(IJ,2) .NE. 4) GO TO 7000        MB 00250
1100  CONTINUE                                                          MB 00260
      IRES=1                                                            MB 00270
      GO TO 7000                                                        MB 00280
700   DO 1200 I= 1,4                                                    MB 00290
      IF( I .LE. 2) J=5                                                 MB 00300
      IF(I .GT. 2) J=6                                                  MB 00310
      IF(GDATA(I,20) .NE. 1 .OR. GDATA(J,20) .NE. 1) GO TO 7000         MB 00320
      IF(GDATA(I,2) .LT. 4) GO TO 7000                                  MB 00330
1200  CONTINUE                                                          MB 00340
6000  IRES= 1                                                           MB 00350
      GO TO 7000                                                        MB 00360
5900  IRES= 0                                                           MB 00370
      GO TO 7000                                                        MB 00380
7000  RETURN                                                            MB 00390
      END                                                               MB 00400

      SUBROUTINE OBJSEC(NUNIT,IRES)                                     MB 00410
C                                                                       MB 00420
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MB 00430
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MB 00440
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MB 00450
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MB 00460
```

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     2XTLETH ,STAT(20,4)                                                    MB 00470
C                                                                           MB 00480
      IRES=0                                                                MB 00490
      GO TO (100,100,100,100,500,500,600),NUNIT                             MB 00500
100   IF (GDATA(NUNIT,16) .EQ. 0.0 .AND. (CTIME-GDATA(NUNIT,15))            MB 00510
     2.GT. 2700) GO TO 101                                                  MB 00520
      IRES= 0                                                               MB 00530
      GO TO 6000                                                            MB 00540
101   IRES= 1                                                               MB 00550
      GO TO 6000                                                            MB 00560
500   IF (NUNIT .EQ. 5) J=1                                                 MB 00570
      IF (NUNIT .EQ. 6) J=3                                                 MB 00580
      K=J+1                                                                 MB 00590
      DO 1100 IJ=J,K                                                        MB 00600
      IF(GDATA(IJ,16) .NE. 0.0 .OR. (CTIME-GDATA(IJ,15)) .LT.               MB 00610
     2 2700) GO TO 501                                                      MB 00620
1100  CONTINUE                                                              MB 00630
      IRES=1                                                                MB 00640
      GO TO 6000                                                            MB 00650
501   IRES=0                                                                MB 00660
      GO TO 6000                                                            MB 00670
600   DO 602 I=1,4                                                          MB 00680
      IF (GDATA(I,16) .NE. 0.0 .OR. (CTIME-GDATA(I,15)) .LT.                MB 00690
     2 2700) GO TO 605                                                      MB 00700
602   CONTINUE                                                              MB 00710
      IRES=1                                                                MB 00720
      GO TO 6000                                                            MB 00730
605   IRES=0                                                                MB 00740
6000  RETURN                                                                MB 00750
      END                                                                   MB 00760

      SUBROUTINE OBJ(NUNIT,SRES)                                            MB 00770
C                                                                           MB 00780
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,             MB 00790
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),      MB 00800
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                       MB 00810
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,       MB 00820
     2XTLETH ,STAT(20,4)                                                    MB 00830
C                                                                           MB 00840
      GO TO (100,100,100,100,200,200),NUNIT                                 MB 00850
100   IF (NUNIT .EQ. 1.OR.NUNIT.EQ.2) J=5                                   MB 00860
      IF (NUNIT.EQ.3.OR.NUNIT.EQ.4) J=6                                     MB 00870
      IF(ABS(GDATA(J,8)-GDATA(NUNIT,8)) .LT.  PRDATA(1,NUNIT,3,1)/3.        MB 00880
     2) GO TO 140                                                           MB 00890
      SRES=7.                                                               MB 00900
      GDATA(NUNIT,20)= 0.0                                                  MB 00910
      OLDDIS= GDATA(NUNIT,8)                                                MB 00920
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      CALL TNGEN((GDATA(NUNIT,8)+PRDATA(1,NUNIT,3,1)),PRDATA(1,NUNIT,3,MB 00930
     22),GDATA(NUNIT,13),(GDATA(NUNIT,13)+PRDATA(1,NUNIT,3,4)),         MB 00940
     3GDATA(NUNIT,8))                                                   MB 00950
      GDATA(NUNIT,19)= GDATA(NUNIT,8)-OLDDIS                            MB 00960
      IF(GDATA(NUNIT,8) .GE. (GDATA(J,8)-GDATA(J,10))) GO TO 1627       MB 00970
      CALL TNGEN(GDATA(NUNIT,17),PRDATA(1,NUNIT,17,2),GDATA(NUNIT,3),   MB 00980
     2GDATA(NUNIT,5),GDATA(NUNIT,7))                                    MB 00990
      CALL TNGEN(PRDATA(1,NUNIT,4,1),PRDATA(1,NUNIT,4,2),PRDATA(1,NUNITMB 01000
     2,4,3),PRDATA(1,NUNIT,4,4),GDATA(NUNIT,9))                         MB 01010
      CALL TNGEN(PRDATA(1,NUNIT,5,1),PRDATA(1,NUNIT,5,2),PRDATA(1,NUNITMB 01020
     2,5,3),PRDATA(1,NUNIT,5,4),GDATA(NUNIT,10))                        MB 01030
      GO TO 6000                                                        MB 01040
 1627 GDATA(NUNIT,8)= OLDDIS                                            MB 01050
 140  SRES=8.                                                           MB 01060
      GDATA(NUNIT,20)= 1.0                                              MB 01070
      OLDDIS= GDATA(NUNIT,8)                                            MB 01080
      IF(NUNIT .EQ. 1 .OR. NUNIT .EQ. 3) GO TO 141                      MB 01090
      ISIDE= 2                                                          MB 01100
      GO TO 143                                                         MB 01110
 141  ISIDE= 1                                                          MB 01120
C                                                                       MB 01130
C     LEFT MOST COMPANY                                                 MB 01140
C                                                                       MB 01150
 143  DE=GDATA(J,9)/2*COS(ABS(GDATA(J,11)))                             MB 01160
      DN= GDATA(J,9)/2*SIN(ABS(GDATA(J,11)))                            MB 01170
      GO TO (144,145),ISIDE                                             MB 01180
 144  IF (GDATA(J,11)) 150,150,151                                      MB 01190
 150  GDATA(NUNIT,7)= GDATA(J,7)-DE/2                                   MB 01200
      GDATA(NUNIT,8)= GDATA(J,8)+DN/2                                   MB 01210
      GDATA(NUNIT,11)= GDATA(J,11)                                      MB 01220
      GDATA(NUNIT,9)= GDATA(J,9)/2                                      MB 01230
      GDATA(NUNIT,10)= GDATA(J,10)                                      MB 01240
      GDATA(NUNIT,19)= GDATA(NUNIT,8)-OLDDIS                            MB 01250
      GO TO 6000                                                        MB 01260
 151  GDATA(NUNIT,7)= GDATA(J,7)-DE/2                                   MB 01270
      GDATA(NUNIT,8)= GDATA(J,8)-DN/2                                   MB 01280
      GDATA(NUNIT,11)= GDATA(J,11)                                      MB 01290
      GDATA(NUNIT,9)= GDATA(J,9)/2                                      MB 01300
      GDATA(NUNIT,10)= GDATA(J,10)                                      MB 01310
      GDATA(NUNIT,19)= GDATA(NUNIT,8)-OLDDIS                            MB 01320
      GO TO 6000                                                        MB 01330
 145  GDATA(NUNIT,7)= GDATA(J,7)+DE/2                                   MB 01340
      IF (GDATA(J,11)) 160,160,161                                      MB 01350
 160  GDATA(NUNIT,8)= GDATA(J,8)-DN/2                                   MB 01360
      GDATA(NUNIT,19)= GDATA(NUNIT,8)-OLDDIS                            MB 01370
      GO TO 170                                                         MB 01380
 161  GDATA(NUNIT,8)= GDATA(J,8)+DN/2                                   MB 01390
 170  GDATA(NUNIT,9)= GDATA(J,9)/2                                      MB 01400
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      GDATA(NUNIT,10)= GDATA(J,10)                                      MB 01410
      GDATA(NUNIT,11)= GDATA(J,11)                                      MB 01420
      GDATA(NUNIT,19)= GDATA(NUNIT,8)-OLDDIS                            MB 01430
      GO TO 6000                                                        MB 01440
200   IF(ABS(GDATA(7,8)-GDATA(NUNIT,8)) .LT. PRDATA(1,NUNIT,3,1)/3.)    MB 01450
     2GO TO 500                                                         MB 01460
C                                                                       MB 01470
C     REGULAR OBJECTIVE                                                 MB 01480
C                                                                       MB 01490
      SRES=7.0                                                          MB 01500
      GDATA(NUNIT,20)= 0.0                                              MB 01510
      OLDDIS= GDATA(NUNIT,8)                                            MB 01520
      CALL TNGEN((GDATA(NUNIT,8)+PRDATA(1,NUNIT,3,1)),PRDATA(1,NUNIT,3,MB 01530
     22),GDATA(NUNIT,13),(GDATA(NUNIT,13)+PRDATA(1,NUNIT,3,4)),         MB 01540
     3GDATA(NUNIT,8))                                                   MB 01550
      IF(GDATA(NUNIT,8) .GE. (GDATA(7,8)-GDATA(7,10))) GO TO 1623       MB 01560
      CALL TNGEN(PRDATA(1,NUNIT,5,1),PRDATA(1,NUNIT,5,2),PRDATA(1,NUNITMB 01570
     2,5,3),PRDATA(1,NUNIT,5,4),GDATA(NUNIT,10))                        MB 01580
      CALL TNGEN(PRDATA(1,NUNIT,4,1),PRDATA(1,NUNIT,4,2),PRDATA(1,NUNITMB 01590
     2,4,3),PRDATA(1,NUNIT,4,4),GDATA(NUNIT,9))                         MB 01600
      CALL UGEN(-.5236,.5236, GDATA(NUNIT,11))                          MB 01610
      CALL TNGEN(GDATA(NUNIT,17),PRDATA(1,NUNIT,17,2),GDATA(NUNIT,3),   MB 01620
     2GDATA(NUNIT,5),GDATA(NUNIT,7))                                    MB 01630
      GDATA(NUNIT,19)= GDATA(NUNIT,8)-OLDDIS                            MB 01640
      GO TO 6000                                                        MB 01650
1623  GDATA(NUNIT,8)= OLDDIS                                            MB 01660
      GO TO 500                                                         MB 01670
C                                                                       MB 01680
C     BATTALION OBJECTIVE IS ON THE BRIGADE OBJECTIVE                   MB 01690
C                                                                       MB 01700
500   SRES=8.                                                           MB 01710
      GDATA(NUNIT,20)= 1.0                                              MB 01720
      OLDDIS= GDATA(NUNIT,8)                                            MB 01730
      IF(NUNIT .EQ. 5) GO TO 501                                        MB 01740
      ISIDE= 2                                                          MB 01750
      GO TO 502                                                         MB 01760
501   ISIDE= 1                                                          MB 01770
502   DE= GDATA(7,9)/4*COS(ABS(GDATA(7,11)))                            MB 01780
      DN= GDATA(7,9)/4*SIN(ABS(GDATA(7,11)))                            MB 01790
      GDATA(NUNIT,9)= GDATA(7,9)/2                                      MB 01800
      GDATA(NUNIT,10)= GDATA(7,10)                                      MB 01810
      GDATA(NUNIT,11)= GDATA(7,11)                                      MB 01820
      GO TO (550,560),ISIDE                                             MB 01830
550   GDATA(NUNIT,7)= GDATA(7,7)-DE                                     MB 01840
      IF(GDATA(7,11)) 551,551,552                                       MB 01850
551   GDATA(NUNIT,8)= GDATA(7,8)+DN                                     MB 01860
      GDATA(NUNIT,19)= GDATA(NUNIT,8)-OLDDIS                            MB 01870
      GO TO 6000                                                        MB 01880
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552   GDATA(NUNIT,8)= GDATA(7,8)-DN                                     MB 01890
      GDATA(NUNIT,19)= GDATA(NUNIT,8)-OLDDIS                            MB 01900
      GO TO 6000                                                        MB 01910
C                                                                       MB 01920
C     BN IS ON THE RIGHT SIDE                                           MB 01930
C                                                                       MB 01940
560   GDATA(NUNIT,7)= GDATA(7,7)+ DE                                    MB 01950
      IF(GDATA(7,11)) 561,561,562                                       MB 01960
561   GDATA(NUNIT,8)= GDATA(7,8)-DN                                     MB 01970
      GDATA(NUNIT,19)= GDATA(NUNIT,8)-OLDDIS                            MB 01980
      GO TO 6000                                                        MB 01990
562   GDATA(NUNIT,8)= GDATA(7,8)+DN                                     MB 02000
      GDATA(NUNIT,19)= GDATA(NUNIT,8)-OLDDIS                            MB 02010
6000  RETURN                                                            MB 02020
      END                                                               MB 02030


      SUBROUTINE IALOC                                                  MB 02040
C                                                                       MB 02050
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MB 02060
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MB 02070
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MB 02080
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MB 02090
     2XTLETH ,STAT(20,4)                                                MB 02100
C                                                                       MB 02110
C     LOCATE BATTERY CENTERS FIRST                                      MB 02120
C                                                                       MB 02130
      DO 100 I=1,3                                                      MB 02140
      IF (I .EQ. 1) K=5                                                 MB 02150
      IF (I .EQ. 2) K=7                                                 MB 02160
      IF (I .EQ. 3) K=6                                                 MB 02170
      CALL TNGEN((GDATA(K,13)-PRDATA(2,I,5,1)),PRDATA(2,I,5,2),         MB 02180
     2(GDATA(K,13)-RMAX),GDATA(K,13),ARDATA(I,7,8))                     MB 02190
100   CALL TNGEN(GDATA(K,12),PRDATA(2,I,4,2),GDATA(K,3),GDATA(K,5),     MB 02200
     2ARDATA(I,7,7))                                                    MB 02210
C                                                                       MB 02220
C     FIND THE AZIMUTH OF LAY                                           MB 02230
C                                                                       MB 02240
C     FIND CENTER OF MASS OF INFANTRY COMPANY TARGETS FIRST             MB 02250
C                                                                       MB 02260
      CMN=0.0                                                           MB 02270
      CME=0.0                                                           MB 02280
      ICOUNT=0                                                          MB 02290
      DO 200 I=1,250                                                    MB 02300
      IF(TGT(I,1) .EQ. 0) GO TO 202                                     MB 02301
      DO 201 J=5,7                                                      MB 02310
      IF (TGT(I,2) .EQ. J) GO TO 200                                    MB 02320
201   CONTINUE                                                          MB 02330
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      CME= CME+ TGT(I,3)                                                 MB 02340
      CMN= CMN+ TGT(I,4)                                                 MB 02350
      ICOUNT= ICOUNT+1                                                   MB 02360
200   CONTINUE                                                           MB 02370
202   CONTINUE                                                           MB 02371
      TCME= CME/ICOUNT                                                   MB 02380
      TCMN= CMN/ICOUNT                                                   MB 02390
C                                                                        MB 02400
C     NOW FIND THE AZIMUTH OF LAY                                        MB 02410
C                                                                        MB 02420
      DO 300 I=1,3                                                       MB 02430
      IF(CME .EQ. 0 .AND. CMN .EQ. 0) GO TO 300                          MB 02431
      ARG= (TCME-ARDATA(I,7,7))/(TCMN-ARDATA(I,7,8))                     MB 02440
      ANGLE= ATAN(ARG)                                                   MB 02450
      IF (ANGLE .LE. 0) ARDATA(I,7,6)= 6.2832-ABS(ANGLE)                 MB 02460
      IF (ANGLE .GT. 0) ARDATA(I,7,6)= ANGLE                             MB 02470
300   CONTINUE                                                           MB 02480
C                                                                        MB 02490
C     POSITION THE WEAPONS                                               MB 02500
C                                                                        MB 02510
      DO 400 I=1,3                                                       MB 02520
      CALL WPLOC(I)                                                      MB 02530
400   CONTINUE                                                           MB 02540
      RETURN                                                             MB 02550
      END                                                                MB 02560

      SUBROUTINE FIPLAN (NUNIT)                                          MB 02570
C                                                                        MB 02580
      REAL GDATA, PRDATA, TGT                                            MB 02590
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,          MB 02600
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),   MB 02610
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                    MB 02620
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,    MB 02630
     2XTLETH ,STAT(20,4)                                                 MB 02640
C                                                                        MB 02650
      INTEGER TYPE                                                       MB 02660
      KUNIT=NUNIT                                                        MB 02670
      K=0                                                                MB 02680
      NCOUNT= NUNIT                                                      MB 02690
      GO TO (1200,1200,1200,1200,1200,1200,1200,1208,1209,1210),NCOUNT MB 02700
1200  IK=KUNIT                                                           MB 02710
      J=KUNIT                                                            MB 02720
      GO TO 1211                                                         MB 02730
1208  IK=1                                                               MB 02740
      J=2                                                                MB 02750
      GO TO 1211                                                         MB 02760
1209  IK=3                                                               MB 02770
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      J=4                                                        MB 02780
      GO TO 1211                                                 MB 02790
1210  IK=1                                                       MB 02800
      J=7                                                        MB 02810
      GO TO 1211                                                 MB 02820
1211  DO 1100 KUNIT=IK,J                                         MB 02830
      IF(GDATA(KUNIT,2) .EQ. 1) ISTAGE=1                         MB 02840
      IF(GDATA(KUNIT,2) .GT. 1) ISTAGE=2                         MB 02850
      UNIT=KUNIT                                                 MB 02860
C                                                                MB 02870
C     DETERMINE THE NUMBER OF TARGETS                            MB 02880
C                                                                MB 02890
      GO TO (600,601),ISTAGE                                     MB 02900
600   CALL EVENT (KUNIT,6,NTGTS)                                 MB 02910
      GO TO 1000                                                 MB 02920
601   CALL EVENT (KUNIT,7,NTGTS)                                 MB 02930
C                                                                MB 02940
C     ENTER THIS POINT WITH THE NUMBER OF TARGETS                MB 02950
C                                                                MB 02960
C     INITIAL FIRE PLAN STAGE =1                                 MB 02970
C                                                                MB 02980
1000  CONTINUE                                                   MB 02990
      IF(NTGTS .EQ. 0) GO TO 6820                                MB 03000
      DO 1100 I=1,NTGTS                                          MB 03010
      ITGT= ITGT+1                                               MB 03020
      STGT=ITGT                                                  MB 03030
C                                                                MB 03040
C     FIND STORAGE VECTOR IN TARGET HISTORY ARRAY                MB 03050
C                                                                MB 03060
      CALL HARRAY(NUM)                                           MB 03070
      TGT(NUM,1)= STGT                                           MB 03080
      TGT(NUM,2)= UNIT                                           MB 03090
      GO TO (1700,1800),ISTAGE                                   MB 03100
1700  CALL EVENT (KUNIT,8,TYPE)                                  MB 03110
1900  GO TO (1710,1720,1730), TYPE                               MB 03120
C                                                                MB 03130
C     TARGET IS PREP                                             MB 03140
C                                                                MB 03150
1710  TGT(NUM,7)= 1.0                                            MB 03160
      CALL EVENT (KUNIT,10,MODE)                                 MB 03170
      CALL TGTGEN(KUNIT,MODE,NUM)                                MB 03180
      GO TO 1100                                                 MB 03190
C                                                                MB 03200
C     TARGET IS SCHEDULED                                        MB 03210
C                                                                MB 03220
1720  TGT(NUM,5)= 1.0                                            MB 03230
      CALL EVENT (KUNIT,12,MODE)                                 MB 03240
      CALL TGTGEN(KUNIT,MODE,NUM)                                MB 03250
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```
      GO TO 1100
C
C     TARGET IS ON CALL
C
1730  TGT(NUM,6)= 1.0
      CALL EVENT (KUNIT,14,MODE)
      CALL TGTGEN(KUNIT,MODE,NUM)
      GO TO 1100
C
C     UNIT IS NOT IN FULL PLANNING STATE
C
1800  CALL EVENT(KUNIT,9,TYPE)
      GO TO (1810,1820,1830),TYPE
C
C     TARGET IS A PREPARATORY TARGET
C
1810  TGT(NUM,7)= 1.0
      CALL EVENT(KUNIT,11,MODE)
      CALL TGTGEN(KUNIT,MODE,NUM)
      GO TO 1100
C
C     TARGET IS SCHEDULED
C
1820  TGT(NUM,5)= 1.0
      CALL EVENT(KUNIT,13,MODE)
      CALL TGTGEN(KUNIT,MODE,NUM)
      GO TO 1100
C
C     TARGET IS ON CALL
C
1830  TGT(NUM,6)= 1.0
      CALL EVENT(KUNIT,15,MODE)
      CALL TGTGEN(KUNIT,MODE,NUM)
1100  CONTINUE
6820  CONTINUE
      IF( K .EQ. 6) GO TO 6012
      GO TO (6000,6000,6000,6000,6000,6000, 6000,5009,5010,6000),NCOUNT
5009  IK=5
      J=5
      K=6
      GO TO 1211
5010  IK=6
      J=6
      K=6
      GO TO 1211
6012  CONTINUE
6000  IF (IROW .EQ. 0) GO TO 6001
      DO 2000 I=1,50
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2000   EVLIST(IROW,I)= 0.0                                                    MB 03740
6001   RETURN                                                                 MB 03750
       END                                                                    MB 03760

       SUBROUTINE TGTGEN(NUNIT,MODE,NUM)                                      MC 00010
C                                                                             MC 00020
       REAL GDATA, PRDATA, TGT                                                MC 00030
       COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,              MC 00040
      2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),       MC 00050
      3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                        MC 00060
       COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,        MC 00070
      2XTLETH ,STAT(20,4)                                                     MC 00080
C                                                                             MC 00090
C      DETERMINE THE BOUNDS                                                   MC 00100
C                                                                             MC 00110
       XUL= -GDATA(NUNIT,9)/2.                                                MC 00120
       YUL= GDATA(NUNIT,10)/2.                                                MC 00130
       XUR= GDATA(NUNIT,9)/2.                                                 MC 00140
       YUR= GDATA(NUNIT,10)/2.                                                MC 00150
       XLL= XUL                                                               MC 00160
       YLL= -GDATA(NUNIT,10)/2.                                               MC 00170
       XLR= XUR                                                               MC 00180
       YLR= YLL                                                               MC 00190
C                                                                             MC 00200
C      TRANSFORM THE COORDINATES                                              MC 00210
C                                                                             MC 00220
       A= GDATA(NUNIT,11)                                                     MC 00230
       XULT= XUL*COS(A)+YUL*SIN(A)+GDATA(NUNIT,7)                             MC 00240
       YULT= YUL*COS(A)-XUL*SIN(A)+GDATA(NUNIT,8)                             MC 00250
       XURT= XUR*COS(A)+YUR*SIN(A)+GDATA(NUNIT,7)                             MC 00260
       YURT= YUR*COS(A)-XUR*SIN(A)+GDATA(NUNIT,8)                             MC 00270
       XLLT= XLL*COS(A)+YLL*SIN(A)+GDATA(NUNIT,7)                             MC 00280
       YLLT= YLL*COS(A)-XLL*SIN(A)+GDATA(NUNIT,8)                             MC 00290
       XLRT= XLR*COS(A)+YLR*SIN(A)+GDATA(NUNIT,7)                             MC 00300
       YLRT= YLR*COS(A)-XLR*SIN(A)+GDATA(NUNIT,8)                             MC 00310
       YLIM1= AMAX1( YULT,YURT,YLLT,YLRT)                                     MC 00320
       YLIM2= AMIN1( YULT,YURT,YLLT,YLRT)                                     MC 00330
       XLIM1= AMIN1( XULT,XURT,XLLT,XLRT)                                     MC 00340
       XLIM2= AMAX1( XULT,XURT,XLLT,XLRT)                                     MC 00350
       GO TO (100,200,300),MODE                                               MC 00360
C                                                                             MC 00370
C      TARGET IS ON THE OBJECTIVE                                             MC 00380
C                                                                             MC 00390
100    CALL UGEN(XLIM1,XLIM2,TGT(NUM,3))                                      MC 00400
       CALL UGEN(YLIM2,YLIM1,TGT(NUM,4))                                      MC 00410
       GO TO 600                                                              MC 00420
C                                                                             MC 00430
```

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C       TARGET IS BETWEEN THE LD AND THE OBJECTIVE                      MC 00440
C                                                                       MC 00450
200     CALL UGEN(GDATA(NUNIT,3),GDATA(NUNIT,5),TGT(NUM,3))             MC 00460
        IF(TGT(NUM,3) .GE. XLIM1 .AND. TGT(NUM,3) .LE. XLIM2) GO TO 201 MC 00470
        CALL UGEN(GDATA(NUNIT,13),YLIM1,TGT(NUM,4))                     MC 00480
        GO TO 600                                                       MC 00490
201     CALL UGEN(GDATA(NUNIT,13),YLIM2,TGT(NUM,4))                     MC 00500
        GO TO 600                                                       MC 00510
C                                                                       MC 00520
C       TARGET IS BEYOND THE OBJECTIVE                                  MC 00530
C                                                                       MC 00540
300     IF(NUNIT .LE. 4) XD=1000.                                       MC 00550
        IF(NUNIT .EQ. 5 .OR. NUNIT .EQ. 6) XD= 2000.                    MC 00560
        IF(NUNIT .EQ. 7) XD= 3000.                                      MC 00570
        CALL UGEN(GDATA(NUNIT,3),GDATA(NUNIT,5),TGT(NUM,3))             MC 00580
        CALL UGEN(YLIM1,YLIM1+XD,TGT(NUM,4))                            MC 00590
600     RETURN                                                          MC 00600
        END                                                             MC 00610


        SUBROUTINE FIALOC(QTIME)                                        MC 00620
C                                                                       MC 00630
        INTEGER CK                                                      MC 00640
        DIMENSION NUM(3),CK(3)                                          MC 00650
        COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,       MC 00660
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MC 00670
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MC 00680
        COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH, MC 00690
     2XTLETH ,STAT(20,4)                                                MC 00700
C                                                                       MC 00710
C       ALLOCATE NON PREP SCHEDULED FIRES FIRST                         MC 00720
C                                                                       MC 00730
        IF (CTIME .EQ. 0) QTIME= CTIME                                  MC 00740
        IF (CTIME .NE. 0) QTIME= CEVENT(4)                              MC 00750
        DO 100 I=1,250                                                  MC 00760
        IF (TGT(I,8) .NE. 0) GO TO 100                                  MC 00770
        ITYPE= TGT(I,5)+1                                               MC 00780
        GO TO (100,200),ITYPE                                           MC 00790
100     CONTINUE                                                        MC 00800
        GO TO 2400                                                      MC 00810
200     IF (TGT(I,2).EQ.1.0.OR.TGT(I,2).EQ.2.0) TGT(I,11)= 1.0          MC 00820
        IF (TGT(I,2).EQ. 3.0.OR.TGT(I,2).EQ.4.0) TGT(I,11)= 3.0         MC 00830
        IF (TGT(I,2).EQ. 5.0) TGT(I,11)= 1.0                            MC 00840
        IF (TGT(I,2) .EQ. 6.0) TGT(I,11)= 3.0                           MC 00850
        IF (TGT(I,2) .EQ. 7.0) TGT(I,11)= 2.0                           MC 00860
        TGT(I,8)= QTIME+((TGT(I,4)-GDATA(7,13))*7200./(1000.*PRDATA(1,1, MC 00870
     216,2)))                                                           MC 00880
        GO TO 100                                                       MC 00890
```

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C                                                                        MC 00900
C     NOW THE PREP                                                       MC 00910
C                                                                        MC 00920
C     DETERMINE THE UNIT CAPABILITIES                                    MC 00930
C                                                                        MC 00940
 2400 DO 300 I=1,250                                                     MC 00950
      IF (TGT(I,8) .NE. 0) GO TO 300                                     MC 00960
      ITYPE= TGT(I,7)+1                                                  MC 00970
      GO TO(300,600),ITYPE                                               MC 00980
  600 DO 301 J=1,3                                                       MC 00990
      IF(ARDATA(J,7,2) .EQ. 3) GO TO 301                                 MC 01000
      IF (RANGE(TGT(I,3),TGT(I,4),J) .LT. RMAX)  TGT(I,14+J)= 1.0        MC 01010
  301 CONTINUE                                                           MC 01020
  300 CONTINUE                                                           MC 01030
      DO 1705 I=1,250                                                    MC 01040
      ITYPE= TGT(I,7)+ 1                                                 MC 01050
      GO TO (1705,800),ITYPE                                             MC 01060
  800 SUM=0.0                                                            MC 01070
      DO 1200 J= 1,3                                                     MC 01080
      SUM= SUM+ TGT(I,J+14)                                              MC 01090
 1200 TGT(I,18) = SUM                                                    MC 01100
 1705 CONTINUE                                                           MC 01110
      SUM1= 0.0                                                          MC 01120
      SUM3= 0.0                                                          MC 01130
      SUM2= 0.0                                                          MC 01140
C                                                                        MC 01150
C                                                                        MC 01160
C     DETERMINE THE NUMBER OF TARGETS EACH UNIT CAN HIT                  MC 01170
C                                                                        MC 01180
      DO 2600 IJ=1,250                                                   MC 01190
      IF(TGT(IJ,15) .EQ. 1) SUM1=SUM1+1                                  MC 01200
      IF(TGT(IJ,16) .EQ. 1) SUM2= SUM2+1                                 MC 01210
      IF(TGT(IJ,17) .EQ. 1) SUM3= SUM3+1                                 MC 01220
 2600 CONTINUE                                                           MC 01230
      NUM(1)= SUM1                                                       MC 01240
      NUM(2)= SUM2                                                       MC 01250
      NUM(3)= SUM3                                                       MC 01260
      DO 1706 I=1,250                                                    MC 01270
      NSUM= TGT(I,18)+1                                                  MC 01280
      GO TO (1706,1707,1708,1709), NSUM                                  MC 01290
C                                                                        MC 01300
C     ONE UNIT ONLY CAN REACH THE TARGET                                 MC 01310
C                                                                        MC 01320
 1707 DO 1216 J=1,3                                                      MC 01330
      IF (TGT(I,J+14).EQ.1.AND.NUM(J).GT.0) GO TO 1215                   MC 01340
 1216 CONTINUE                                                           MC 01350
      DO 8610 JX=1,40                                                    MC 01360
 8610 TGT(I,JX)=0.0                                                      MC 01370
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```
      GO TO 1706                                                        MC 01380
 1215 TGT(I,11)= 1.*J                                                   MC 01390
      NUM(J)= NUM(J)-1                                                  MC 01400
      GO TO 1706                                                        MC 01410
C                                                                       MC 01420
C     TWO UNITS CAN HIT THE TARGET                                      MC 01430
C                                                                       MC 01440
 1708 ICOUNT=0                                                          MC 01450
      IR=0                                                              MC 01460
      DO 7010 JX=1,3                                                    MC 01470
 7010 CK(JX)=0                                                          MC 01480
      DO 1225 K=1,3                                                     MC 01490
      IF (TGT(I,K+14) .EQ.1 .AND. NUM(K).GT.0) GO TO 1226               MC 01500
      GO TO 1225                                                        MC 01510
 1226 CK(K)=1                                                           MC 01520
      ICOUNT= ICOUNT+1                                                  MC 01530
 1225 CONTINUE                                                          MC 01540
      IF (ICOUNT .EQ. 0) GO TO 1275                                     MC 01550
      GO TO (6300,6301),ICOUNT                                          MC 01560
 6300 DO 6302 IK=1,3                                                    MC 01570
      IF (CK(IK) .NE. 0) NUNIT=IK                                       MC 01580
 6302 CONTINUE                                                          MC 01590
      TGT(I,11)= 1.*NUNIT                                               MC 01600
      NUM(NUNIT)= NUM(NUNIT)-1                                          MC 01610
      GO TO 1706                                                        MC 01620
 1275 CONTINUE                                                          MC 01630
      DO 1276 JX=1,40                                                   MC 01640
 1276 TGT(I,JX)= 0.0                                                    MC 01650
      GO TO 1706                                                        MC 01660
 6301 DO 6900 JX1=1,3                                                   MC 01670
      DO 6900 JX2= 1,3                                                  MC 01680
      IF(JX1 .EQ. JX2) GO TO 6900                                       MC 01690
      IF(CK(JX1) .EQ. 1 .AND. CK(JX2) .EQ. 1) GO TO 6901                MC 01700
 6900 CONTINUE                                                          MC 01710
 6901 CONTINUE                                                          MC 01720
      IF(NUM(JX1) .LT. NUM(JX2)) GO TO 6902                             MC 01730
      IF(NUM(JX1) .GT. NUM(JX2)) GO TO 6903                             MC 01740
C                                                                       MC 01750
C     NUMBER OF TARGETS ARE EQUAL                                       MC 01760
C                                                                       MC 01770
      CALL UNIF(RNNR)                                                   MC 01780
      IF(RNNR .LT. .5) IR=JX1                                           MC 01790
      IF(RNNR .GE. .5) IR=JX2                                           MC 01800
      TGT(I,11)= IR*1.                                                  MC 01810
      NUM(JX1)= NUM(JX1)-1                                              MC 01820
      NUM(JX2)= NUM(JX2)-1                                              MC 01830
      GO TO 1706                                                        MC 01840
 6902 TGT(I,11)= JX2*1.                                                 MC 01850
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      NUM(JX1)= NUM(JX1)-1                                              MC 01860
      NUM(JX2)= NUM(JX2)-1                                              MC 01870
      GO TO 1706                                                        MC 01880
 6903 TGT(I,11)= JX1*1.                                                 MC 01890
      NUM(JX1)= NUM(JX1)-1                                              MC 01900
      NUM(JX2)= NUM(JX2)-1                                              MC 01910
      GO TO 1706                                                        MC 01920
C                                                                       MC 01930
C     ALL UNITS CAN HIT                                                 MC 01940
C                                                                       MC 01950
 1709 ICOUNT=0                                                          MC 01960
      DO 2000 L=1,3                                                     MC 01970
      IF(NUM(L) .GT. 0) ICOUNT=ICOUNT+1                                 MC 01980
 2000 CONTINUE                                                          MC 01990
      IF(ICOUNT .EQ. 0) GO TO 1275                                      MC 02000
 1901 GO TO (1707,1708,1995),ICOUNT                                     MC 02010
C                                                                       MC 02020
C     FIND MIN NUM                                                      MC 02030
C                                                                       MC 02040
 1995 MIN=100                                                           MC 02050
      DO 1996 L=1,3                                                     MC 02060
      IF (NUM(L) .LT. MIN) GO TO 1997                                   MC 02070
 1996 CONTINUE                                                          MC 02080
      GO TO 1998                                                        MC 02090
 1997 MIN= NUM(L)                                                       MC 02100
      N=L                                                               MC 02110
      GO TO 1996                                                        MC 02120
 1998 TGT(I,11)= 1.*N                                                   MC 02130
      DO 1999 L=1,3                                                     MC 02140
 1999 NUM(L)= NUM(L)-1                                                  MC 02150
 1706 CONTINUE                                                          MC 02160
C                                                                       MC 02170
C     REZERO TARGET FLAGS                                               MC 02180
C                                                                       MC 02190
      DO 2700 I=1,250                                                   MC 02200
      DO 2700 J=14,18                                                   MC 02210
 2700 TGT(I,J)= 0.0                                                     MC 02220
C                                                                       MC 02230
C     STACK THE EVENT LIST FOR ALL SCHEDULED TARGETS                    MC 02240
C                                                                       MC 02250
      DO 2500 I=1,250                                                   MC 02260
      IF (TGT(I,5) .EQ. 0 .OR. TGT(I,39) .EQ. 0) GO TO 2500             MC 02270
      CALL EARRAY(IOPEN)                                                MC 02280
      EVLIST(IOPEN,1)=TGT(I,8)-60                                       MC 02290
      EVLIST(IOPEN,2)= 1.                                               MC 02300
      EVLIST(IOPEN,3)=TGT(I,1)                                          MC 02310
      EVLIST(IOPEN,4)= 1.*I                                             MC 02320
      EVLIST(IOPEN,6)= TGT(I,3)                                         MC 02330
```

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      EVLIST(IOPEN,7)= TGT(I,4)                                         MC 02340
      EVLIST(IOPEN,8)= TGT(I,2)                                         MC 02350
      EVLIST(IOPEN,9)= TGT(I,11)                                        MC 02360
      EVLIST(IOPEN,16)= 1.                                              MC 02370
      EVLIST(IOPEN,17)= 1.0                                             MC 02380
      EVLIST(IOPEN,21)= 4.0                                             MC 02390
      EVLIST(IOPEN,32)= TGT(I,3)                                        MC 02400
      EVLIST(IOPEN,33)= TGT(I,4)                                        MC 02410
      EVLIST(IOPEN,36)= TGT(I,3)                                        MC 02420
      EVLIST(IOPEN,37)= TGT(I,4)                                        MC 02430
      TGT(I,39)= 0.0                                                    MC 02440
      TGT(I,20)= IOPEN*1.                                               MC 02450
 2500 CONTINUE                                                          MC 02460
C                                                                       MC 02470
C     DETERMINE TIMES FOR PREP TARGETS AND STACK EVENT LIST             MC 02480
C                                                                       MC 02490
      DO 2800 I=1,3                                                     MC 02500
      TIME= QTIME                                                       MC 02510
      DO 2701 J=1,250                                                   MC 02520
      IF (TGT(J,7) .EQ. 0 .OR. TGT(J,39) .EQ. 0) GO TO 2701             MC 02530
      IF(TGT(J,11) .NE. I) GO TO 2701                                   MC 02540
      TIME= TIME -180.                                                  MC 02550
      TGT(J,8)= TIME                                                    MC 02560
      TGT(J,39)= 0.0                                                    MC 02570
      CALL EARRAY(IO)                                                   MC 02580
      EVLIST(IO,1)= TIME -60                                            MC 02590
      EVLIST(IO,2)= 1.                                                  MC 02600
      EVLIST(IO,17)= 1.0                                                MC 02610
      EVLIST(IO,3)= TGT(J,1)                                            MC 02620
      EVLIST(IO,4)= 1.*J                                                MC 02630
      EVLIST(IO,6)= TGT(J,3)                                            MC 02640
      EVLIST(IO,7)= TGT(J,4)                                            MC 02650
      EVLIST(IO,8)= TGT(J,2)                                            MC 02660
      EVLIST(IO,9)= TGT(J,11)                                           MC 02670
      EVLIST(IO,16)= 1.                                                 MC 02680
      EVLIST(IO,21)= 2.0                                                MC 02690
      EVLIST(IO,32)= TGT(J,3)                                           MC 02700
      EVLIST(IO,33)= TGT(J,4)                                           MC 02710
      EVLIST(IO,36)= TGT(J,3)                                           MC 02720
      EVLIST(IO,37)= TGT(J,4)                                           MC 02730
      TGT(J,20)= IO*1.                                                  MC 02740
 2701 CONTINUE                                                          MC 02750
 2800 CONTINUE                                                          MC 02760
      RETURN                                                            MC 02770
      END                                                               MC 02780
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      SUBROUTINE MOARTY                                                 MC 02790
C                                                                       MC 02800
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MC 02810
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MC 02820
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MC 02830
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MC 02840
     2XTLETH ,STAT(20,4)                                                MC 02850
C                                                                       MC 02860
      DIMENSION USAT(3,3)                                               MC 02870
      NCOUNT=0                                                          MC 02880
      RC= 2.*RMAX/3.                                                    MC 02890
C                                                                       MC 02900
C     IF UNIT IS GREATER THAN RMAX BACK OF FRONT LINE MOVE IT           MC 02910
C                                                                       MC 02920
      DO 2100 I=1,3                                                     MC 02930
      IF((GDATA(7,13)-ARDATA(I,7,8)) .GE. RMAX) CALL MAUNIT(I)          MC 02940
2100  CONTINUE                                                          MC 02950
C                                                                       MC 02960
C     DETERMINE IF ANY UNITS ARE ALREADY MOVING (RESCHEDULE DECISION)   MC 02970
C                                                                       MC 02980
      DO 100 I=1,3                                                      MC 02990
      IF (ARDATA(I,7,2) .EQ. 3.0) GO TO 101                             MC 03000
100   CONTINUE                                                          MC 03010
C                                                                       MC 03020
C     DETERMINE IF ANY UNIT IS GREATER THAN 2/3 MAX RANGE BACK OF FORWAMC 03030
C     ELEMENTS                                                          MC 03040
C                                                                       MC 03050
      DO 200 I=1,3                                                      MC 03060
      IF (I .EQ. 1) IS=5                                                MC 03070
      IF (I .EQ. 2) IS= 7                                               MC 03080
      IF (I .EQ. 3) IS= 6                                               MC 03090
      UN= I                                                             MC 03100
      USAT (I,1)= UN                                                    MC 03110
      USAT (I,2)= ARDATA (I,7,2)                                        MC 03120
      USAT(I,3)= GDATA(IS,13)-ARDATA(I,7,8)                             MC 03130
200   CONTINUE                                                          MC 03140
      IF(USAT(1,3) .LT. RC .AND. USAT(2,3) .LT. RC .AND. USAT(3,3)      MC 03150
     2.LT. RC) GO TO 102                                                MC 03160
401   RMIN= AMAX1(USAT(1,3),USAT(2,3),USAT(3,3))                        MC 03170
      IF (RMIN .EQ. 0) GO TO 103                                        MC 03180
      DO 300 N=1,3                                                      MC 03190
      IF (USAT(N,3) .EQ. RMIN) NUN= N                                   MC 03200
300   CONTINUE                                                          MC 03210
      IF (USAT(NUN,2) .EQ.1) GO TO 400                                  MC 03220
      USAT(NUN,3)= 0.0                                                  MC 03230
      GO TO 401                                                         MC 03240
101   EVLIST(IROW,1)= CTIME+600                                         MC 03250
      GO TO 1700                                                        MC 03260
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102     EVLIST(IROW,1)= CTIME+ 900                                          MC 03270
        GO TO 1700                                                          MC 03280
103     EVLIST(IROW,1)= CTIME+ 300                                          MC 03290
400     CALL MAUNIT(NUN)                                                    MC 03300
        GO TO 102                                                           MC 03310
1700    RETURN                                                              MC 03320
        END                                                                 MC 03330


        SUBROUTINE MAUNIT(NUN)                                              MD 00010
C                                                                           MD 00020
        DIMENSION USAT(3,3)                                                 MD 00030
        COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,           MD 00040
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),      MD 00050
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                       MD 00060
        COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,     MD 00070
     2XTLETH ,STAT(20,4)                                                    MD 00080
C                                                                           MD 00090
C       MOVE UNIT NUN                                                       MD 00100
C                                                                           MD 00110
400     IF (NUN.EQ. 1) ID= 5                                                MD 00120
        IF (NUN.EQ.2) ID= 7                                                 MD 00130
        IF (NUN.EQ.3) ID= 6                                                 MD 00140
C                                                                           MD 00150
C       FIND NEW POSITION                                                   MD 00160
C                                                                           MD 00170
        OE= ARDATA(NUN,7,7)                                                 MD 00180
        ON= ARDATA(NUN,7,8)                                                 MD 00190
        SMN= GDATA(ID,13) -PRDATA(2,NUN,5,1)                                MD 00200
        CALL TNGEN(SMN,PRDATA(2,NUN,5,2),(GDATA(ID,13)-RMAX),               MD 00210
     2GDATA(ID,13),ARDATA(NUN,7,8))                                         MD 00220
        CALL TNGEN(GDATA(ID,17),PRDATA(2,NUN,4,2),GDATA(ID,3),              MD 00230
     2GDATA(ID,5),ARDATA(NUN,7,7))                                          MD 00240
C                                                                           MD 00250
C       FIND AZIMUTH OF FIRE                                                MD 00260
C                                                                           MD 00270
        IF (NUN .EQ. 2) GO TO 500                                           MD 00280
        IF (NUN .EQ. 3) GO TO 501                                           MD 00290
        U1= 1.0                                                             MD 00300
        U2= 2.0                                                             MD 00310
        GO TO 502                                                           MD 00320
501     U1= 3.                                                              MD 00330
        U2= 4.                                                              MD 00340
502     CME= 0.0                                                            MD 00350
        CMN= 0.0                                                            MD 00360
        DO 701 I=1,250                                                      MD 00370
        IF (TGT(I,2) .EQ. U1 .OR. TGT(I,2) .EQ. U2 .AND. TGT(I,5) .EQ. 1 MD 00380
     2.AND.TGT(I,8) .GT. (CTIME+900)) GO TO 702                             MD 00390
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701     CONTINUE                                                           MD 00400
        IF (CME .EQ.0.0 .AND. CMN .EQ. 0.0) GO TO 800                      MD 00410
        GO TO 703                                                          MD 00420
702     CME= CME+ TGT(I,3)                                                 MD 00430
        CMN= CMN+ TGT(I,4)                                                 MD 00440
        NCOUNT=NCOUNT+1                                                    MD 00450
        GO TO 701                                                          MD 00460
703     SLD= CME/NCOUNT-ARDATA(NUN,7,7)                                    MD 00470
        SDD= CMN/NCOUNT-ARDATA(NUN,7,8)                                    MD 00480
        ARG= SLD/SDD                                                       MD 00490
        ANGLE= ATAN(ARG)                                                   MD 00500
        IF (ANGLE .LE. 0) ARDATA(NUN,7,6)= 6.2832- ABS(ANGLE)              MD 00510
        IF (ANGLE .GT. 0) ARDATA(NUN,7,6) = ANGLE                          MD 00520
        GO TO 700                                                          MD 00530
800     ARDATA (NUN,7,6)= 0.0                                              MD 00540
        GO TO 700                                                          MD 00550
500     CMN= 0.0                                                           MD 00560
        CME= 0.0                                                           MD 00570
        DO 1100 I=1,250                                                    MD 00580
        IF (TGT(I,5) .EQ. 1 .AND. TGT(I,8) .GT. (CTIME+900)) GO TO 1200    MD 00590
1100    CONTINUE                                                           MD 00600
        IF (CME .EQ. 0.0 .AND. CMN .EQ. 0.0) GO TO 800                     MD 00610
        GO TO 703                                                          MD 00620
1200    CMN= CMN+ TGT(I,4)                                                 MD 00630
        CME= CME+ TGT(I,3)                                                 MD 00640
        NCOUNT=NCOUNT+1                                                    MD 00650
        GO TO 1100                                                         MD 00660
700     ARDATA (NUN,7,2)= 3.                                               MD 00670
        CALL UGEN (1.0,2.0,RESULT)                                         MD 00680
        DIS= SQRT((ARDATA(NUN,7,3)-OE)**2+(ARDATA(NUN,7,4)-ON)**2)*        MD 00690
     2RESULT                                                               MD 00700
        CALL TNGEN(PRDATA(2,NUN,7,1),PRDATA(2,NUN,7,2),PRDATA(2,NUN,7,3),MD 00710
     2PRDATA(2,NUN,7,4),RATE)                                              MD 00720
        CALL TNGEN(PRDATA(2,NUN,6,1),PRDATA(2,NUN,6,2),PRDATA(2,NUN,6,3),MD 00730
     2PRDATA(2,NUN,6,4),TMOD)                                              MD 00740
        CALL TNGEN(PRDATA(2,NUN,8,1),PRDATA(2,NUN,8,2),PRDATA(2,NUN,8,3),MD 00750
     2PRDATA(2,NUN,8,4),TEMPL)                                             MD 00760
        TMOV= DIS * 3600/(1000.*RATE)                                      MD 00770
        CALL EARRAY(IOPEN)                                                 MD 00780
        EVLIST(IOPEN,1) = CTIME+ TMOV+ TMOD+ TEMPL                         MD 00790
        EVLIST(IOPEN,2)= 9.0                                               MD 00800
        EVLIST(IOPEN,3)= NUN*1.0                                           MD 00810
1700    RETURN                                                             MD 00820
        END                                                                MD 00830
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      SUBROUTINE WPLOC (NUNIT)                                          MD 00840
C                                                                       MD 00850
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MD 00860
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MD 00870
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MD 00880
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MD 00890
     2XTLETH ,STAT(20,4)                                                MD 00900
      DIMENSION DEP(6), SLAT(6), THETA (6), DIS(6)                      MD 00910
C                                                                       MD 00920
C                                                                       MD 00930
C     FIND THE ACTUAL BATTERY CENTER                                    MD 00940
C                                                                       MD 00950
      CALL TNGEN(ARDATA(NUNIT,7,7),PRDATA(2,NUNIT,9,2),                 MD 00960
     2(ARDATA(NUNIT,7,7)-PRDATA(2,NUNIT,9,4)),(ARDATA(NUNIT,7,7)+       MD 00970
     3PRDATA(2,NUNIT,9,4)),ARDATA(NUNIT,7,3))                           MD 00980
      CALL TNGEN(ARDATA(NUNIT,7,8),PRDATA(2,NUNIT,9,2),                 MD 00990
     2AMAX1((ARDATA(NUNIT,7,8)-RMAX),(ARDATA(NUNIT,7,8)-PRDATA(2,NUNIT, MD 01000
     39,4))),AMIN1(GDATA(7,13),(ARDATA(NUNIT,7,8)+PRDATA(2,NUNIT,9,4))),MD 01010
     4ARDATA(NUNIT,7,4))                                                MD 01020
C                                                                       MD 01030
C     COMPUTE THE ERROR                                                 MD 01040
C                                                                       MD 01050
      DO 3701 I=9,10                                                    MD 01060
      ARDATA(NUNIT,7,I)= ARDATA(NUNIT,7,(I-2))-ARDATA(NUNIT,7,(I-6))    MD 01070
3701  CONTINUE                                                          MD 01080
C                                                                       MD 01090
C     POSITION THE WEAPONS                                              MD 01100
C                                                                       MD 01110
      DO 100 I=1,6                                                      MD 01120
      CALL UGEN (PRDATA(2,NUNIT,(I+9),1),PRDATA(2,NUNIT,(I+9),2),       MD 01130
     2DEP(I))                                                           MD 01140
100   CALL UGEN (PRDATA (2,NUNIT,(I+9),3),PRDATA(2,NUNIT,(I+9),4),      MD 01150
     2 SLAT(I))                                                         MD 01160
      DO 700 I= 1,NGUNS                                                 MD 01170
      ANGLE= ARDATA(NUNIT,7,6)                                          MD 01180
      ARDATA(NUNIT,I,3)= -DEP(I)*SIN(ANGLE)+SLAT(I)*COS(ANGLE)+ARDATA   MD 01190
     2(NUNIT,7,3)                                                       MD 01200
      ARDATA(NUNIT,I,4)= DEP(I)*COS(ANGLE)+SLAT(I)*SIN(ANGLE)+ARDATA    MD 01210
     2(NUNIT,7,4)                                                       MD 01220
700   CONTINUE                                                          MD 01230
C                                                                       MD 01240
C     ALTER UNIT STATUS LIGHTS                                          MD 01250
C                                                                       MD 01260
2000  ARDATA(NUNIT,7,2)= 1.0                                            MD 01270
      IF (IROW .EQ. 0) GO TO 6000                                       MD 01280
      DO 2700 I=1,50                                                    MD 01290
2700  EVLIST(IROW,I)= 0.0                                               MD 01300
6000  RETURN                                                            MD 01310
```

```
      END                                                               MD 01320
                                                                        
      SUBROUTINE TOGEN                                                  MD 01330
C                                                                       MD 01340
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MD 01350
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MD 01360
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MD 01370
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MD 01380
     2XTLETH ,STAT(20,4)                                                MD 01390
C                                                                       MD 01400
C     DETERMINE THE NUMBER OF UNITS NOT ENGAGED AND SELECT A UNIT       MD 01410
C                                                                       MD 01420
      JCOUNT=0                                                          MD 01430
      DO 1600 I=1,4                                                     MD 01440
      IF(GDATA(I,16) .EQ. 1) GO TO 1600                                 MD 01450
      IF((CTIME-GDATA(I,15)) .GT. 2700 .AND. GDATA(I,2) .EQ. 4) GO TO   MD 01460
     21600                                                              MD 01470
      IF(GDATA(I,2) .EQ. 1) GO TO 1600                                  MD 01480
      IF(GDATA(I,2) .GT. 4) GO TO 1600                                  MD 01490
      GO TO 120                                                         MD 01500
 1600 CONTINUE                                                          MD 01510
      GO TO 125                                                         MD 01520
  120 JCOUNT=JCOUNT+1                                                   MD 01530
      GO TO 1600                                                        MD 01540
  125 NUM= JCOUNT+1                                                     MD 01550
      IF (NUM .GT. 1) ITGT= ITGT+1                                      MD 01560
      GO TO (5000,700,800,900,1000),NUM                                 MD 01570
C                                                                       MD 01580
C     ONE UNIT NOT ENGAGED                                              MD 01590
C                                                                       MD 01600
  700 DO 160 I=1,4                                                      MD 01610
      IF (GDATA(I,16) .EQ. 0) GO TO 500                                 MD 01620
  160 CONTINUE                                                          MD 01630
  500 NUNIT= I                                                          MD 01640
      GO TO 4000                                                        MD 01650
C                                                                       MD 01660
C     TWO UNITS NOT ENGAGED                                             MD 01670
C                                                                       MD 01680
  800 CALL UNIF(RNNR)                                                   MD 01690
      IF (RNNR .LE. .5) GO TO 801                                       MD 01700
      NUM=2                                                             MD 01710
      GO TO 802                                                         MD 01720
  801 NUM=1                                                             MD 01730
  802 ICOUNT=0                                                          MD 01740
      DO 803 I=1,4                                                      MD 01750
      IF(GDATA(I,16) .NE. 0) GO TO 803                                  MD 01760
      ICOUNT=ICOUNT+1                                                   MD 01770
```

```
      IF(ICOUNT .EQ. NUM) GO TO 804                                     MD 01780
803   CONTINUE                                                          MD 01790
804   NUNIT=I                                                           MD 01800
      GO TO 4000                                                        MD 01810
C                                                                       MD 01820
C     THREE UNITS NOT ENGAGED                                           MD 01830
C                                                                       MD 01840
900   CALL UNIF(RNNR)                                                   MD 01850
      IF(RNNR .LE. .333) GO TO 901                                      MD 01860
      IF (RNNR .LE. .667) GO TO 902                                     MD 01870
      NUM=1                                                             MD 01880
      GO TO 903                                                         MD 01890
901   NUM=2                                                             MD 01900
      GO TO 903                                                         MD 01910
902   NUM=3                                                             MD 01920
      GO TO 903                                                         MD 01930
903   ICOUNT=0                                                          MD 01940
      DO 1200 I=1,4                                                     MD 01950
      IF(GDATA(I,16) .EQ. 1) GO TO 1200                                 MD 01960
      IF((CTIME-GDATA(I,15)) .GT. 2700 .AND. GDATA(I,2) .EQ. 4) GO TO   MD 01970
     21200                                                              MD 01980
      IF(GDATA(I,2) .EQ. 1) GO TO 1200                                  MD 01990
      IF(GDATA(I,2) .GT. 4) GO TO 1200                                  MD 02000
      ICOUNT= ICOUNT+1                                                  MD 02010
      IF(ICOUNT .EQ. NUM) GO TO 1201                                    MD 02020
1200  CONTINUE                                                          MD 02030
1201  NUNIT=I                                                           MD 02040
      GO TO 4000                                                        MD 02050
C                                                                       MD 02060
C     ALL UNITS ARE FREE                                                MD 02070
C                                                                       MD 02080
1000  CALL UNIF(RNNR)                                                   MD 02090
      IF (RNNR .LE. .25) GO TO 1001                                     MD 02100
      IF (RNNR .LE. .5) GO TO 1002                                      MD 02110
      IF (RNNR .LE. .75) GO TO 1003                                     MD 02120
      NUNIT= 4                                                          MD 02130
      GO TO 4000                                                        MD 02140
1001  NUNIT= 1                                                          MD 02150
      GO TO 4000                                                        MD 02160
1002  NUNIT=2                                                           MD 02170
      GO TO 4000                                                        MD 02180
1003  NUNIT=3                                                           MD 02190
      GO TO 4000                                                        MD 02200
C                                                                       MD 02210
C     DETERMINE THE LOCATION OF THE TARGET                              MD 02220
C                                                                       MD 02230
4000  CALL HARRAY(I)                                                    MD 02240
      TGT(I,1)= 1.*ITGT                                                 MD 02250
```

```
C                                                                       MD 02260
C     DETERMINE THE ACTUAL TARGET LOCATION                              MD 02270
C                                                                       MD 02280
      CALL UGEN(GDATA(NUNIT,3),GDATA(NUNIT,5),TGT(I,3))                 MD 02290
      CALL UGEN(GDATA(NUNIT,13),(GDATA(NUNIT,13)+500),TGT(I,4))         MD 02300
C                                                                       MD 02310
C     COMPUTE THE ANGLE FROM FPC TO TARGET                              MD 02320
C                                                                       MD 02330
      ARG= (TGT(I,3)-GDATA(NUNIT,12))/(TGT(I,4)-GDATA(NUNIT,13))        MD 02340
      ANGLE= ATAN(ARG)                                                  MD 02350
C                                                                       MD 02360
C     COMPUTE RANGE FROM FPC TO TARGET                                  MD 02370
C                                                                       MD 02380
      TRAN= DIST(TGT(I,3),TGT(I,4),GDATA(NUNIT,12),GDATA(NUNIT,13))     MD 02390
C                                                                       MD 02400
C     DETERMINE LOCATION IN FO COORDINATE SYSTEM                        MD 02410
C                                                                       MD 02420
C     COMPUTE ERROR VARIANCES                                           MD 02430
C                                                                       MD 02440
      VARE= PRDATA(2,5,2,1)+PRDATA(2,5,2,2)*TRAN                        MD 02450
      VARN= PRDATA(2,5,3,1)+PRDATA(2,5,3,2)*TRAN                        MD 02460
      CALL TNGEN(0.0,VARE,-PRDATA(2,5,2,4),PRDATA(2,5,2,4),TGE)         MD 02470
      CALL TNGEN(0.0,VARN,-PRDATA(2,5,3,4),PRDATA(2,5,3,4),TGN)         MD 02480
C                                                                       MD 02490
C     TRANSFORM COORDINATES TO BASE COORDINATE SYSTEM                   MD 02500
C                                                                       MD 02510
      CN= TGT(I,4)+ TGN*COS(ANGLE)+TGE*SIN(ANGLE)                       MD 02520
      CE= TGT(I,3)+ TGE*COS(ANGLE)-TGN*SIN(ANGLE)                       MD 02530
C                                                                       MD 02540
C     ENTER DATA IN TARGET ARRAY                                        MD 02550
C                                                                       MD 02560
      TGT(I,9)= 1.0                                                     MD 02570
      TGT(I,10)= CTIME                                                  MD 02580
      TGT(I,2)= 1.*NUNIT                                                MD 02590
      TGT(I,21)= TGT(I,3)-CE                                            MD 02600
      TGT(I,22)= TGT(I,4)-CN                                            MD 02610
C                                                                       MD 02620
C     SET UP EVENT IN EVENT CHAIN                                       MD 02630
C                                                                       MD 02640
C     DETERMINE TIME FOR MISSION PREPARATION BY FO                      MD 02650
C                                                                       MD 02660
400   CALL TNGEN(PRDATA(2,4,2,1),PRDATA(2,4,2,2),PRDATA(2,4,2,3),       MD 02670
     2PRDATA(2,4,2,4),PTIME)                                            MD 02680
C                                                                       MD 02690
C     DETERMINE THE TIME REQUIRED FOR TRANSMISSION TO FDC               MD 02700
C                                                                       MD 02710
      CALL TNGEN(PRDATA(2,4,3,1),PRDATA(2,4,3,2),PRDATA(2,4,3,3),       MD 02720
     2PRDATA(2,4,3,4),TTIME)                                            MD 02730
```

```
C
C     PUT EVENT IN EVENT CHAIN
C
      CALL EARRAY(IS)
      EVLIST(IS,1)= CTIME+ TTIME+PTIME
      EVLIST(IS,2)= 1.0
      EVLIST(IS,3)= TGT(I,1)
      EVLIST(IS,4)= 1.*I
      TGT(I,20)= IS*1.
      CALL DARRAY(IA)
      EVLIST(IS,5)= 1.*IA
      EVLIST(IS,6)= CE
      EVLIST(IS,7)= CN
      EVLIST(IS,8)= 1.*NUNIT
      EVLIST(IS,16)= 0.0
      EVLIST(IS,17)= 1.0
      EVLIST(IS,19)= CTIME
      EVLIST(IS,21)= 1.0
      EVLIST(IS,36)= TGT(I,3)
      EVLIST(IS,37)= TGT(I,4)
      EVLIST(IS,41)= CE
      EVLIST(IS,42)= CN
      EVLIST(IS,43)= ANGLE
      CALL DESTGT(IA,I,IS)
C
C     ENGAGE THE UNIT
C
      GDATA(NUNIT,16)= 1.0
      GDATA(NUNIT,18)= CTIME
C
C     SET UP NEXT TARGET EVENT
C
5000  CALL EARRAY(NEXT)
      CALL EXPON(TINC)
      EVLIST(NEXT,1)=CTIME+ TINC
      EVLIST(NEXT,2)= 12.0
      TOPT= CTIME+ TINC
C
C     SET UP DECISION EVENT
C
      EVLIST(5,1)= TOPT-1
      DO 6850 I=1,50
6850  EVLIST(IROW,I)= 0.0
6000  RETURN
      END
```

```
      SUBROUTINE DESTGT(IA,ISOK,I)                                      MD 03190
C                                                                       MD 03200
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MD 03210
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MD 03220
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MD 03230
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MD 03240
     2XTLETH ,STAT(20,4)                                                MD 03250
C                                                                       MD 03260
      CALL UNIF(RNNR)                                                   MD 03270
      IF (RNNR .LE. PRDATA(3,1,11,1)) GO TO 100                         MD 03280
C                                                                       MD 03290
C     TARGET IS SIZE CAT I                                              MD 03300
C                                                                       MD 03310
      TGT(ISOK,23)= 1.0                                                 MD 03320
      CALL UGEN(PRDATA(3,1,10,1),PRDATA(3,1,10,2),SNO)                  MD 03330
      NPERS= SNO                                                        MD 03340
      CALL TNGEN(PRDATA(3,1,1,1),PRDATA(3,1,1,2),PRDATA(3,1,1,3),       MD 03350
     2PRDATA(3,1,1,4),SLAT)                                             MD 03360
      CALL TNGEN(PRDATA(3,1,2,1),PRDATA(3,1,2,2),PRDATA(3,1,2,3),       MD 03370
     2PRDATA(3,1,2,4),ZONE1)                                            MD 03380
      CALL TNGEN(PRDATA(3,1,3,1),PRDATA(3,1,3,2),PRDATA(3,1,3,3),       MD 03390
     2PRDATA(3,1,3,4),ZONE2)                                            MD 03400
      CALL TNGEN(PRDATA(3,1,4,1),PRDATA(3,1,4,2),PRDATA(3,1,4,3),       MD 03410
     2PRDATA(3,1,4,4),ZONE3)                                            MD 03420
 5000 NZN1= NPERS*.5                                                    MD 03430
      NZN2= NPERS*.4                                                    MD 03440
      NZN3= NPERS*.1                                                    MD 03450
      SLATL= TGT(ISOK,3)-SLAT/2                                         MD 03460
      SLATR= TGT(ISOK,3)+ SLAT/2                                        MD 03470
      Z1F= TGT(ISOK,4)                                                  MD 03480
      Z1R= TGT(ISOK,4)+ZONE1                                            MD 03490
      Z2F= Z1R                                                          MD 03500
      Z2R= Z1R+ ZONE2                                                   MD 03510
      Z3F= Z2R                                                          MD 03520
      Z3R= Z2R+ ZONE3                                                   MD 03530
      NTOT= NZN1+ NZN2+NZN3                                             MD 03540
      TGT(ISOK,26)=1.*NTOT                                              MD 03550
      TGT(ISOK,24)= SLAT                                                MD 03560
      TGT(ISOK,25)= ZONE1+ZONE2+ZONE3                                   MD 03570
      TGT(ISOK,27)= TGT(ISOK,26)/(TGT(ISOK,25)*TGT(ISOK,24))            MD 03580
      EVLIST(I,18)= 1.*NTOT                                             MD 03590
      DO 1100 N= 1,NTOT                                                 MD 03600
      CALL UGEN(SLATL,SLATR,TDES(IA,N,1))                               MD 03610
 1100 CONTINUE                                                          MD 03620
C                                                                       MD 03630
C     DO ZONE 1                                                         MD 03640
C                                                                       MD 03650
      DO 1101 N= 1,NZN1                                                 MD 03660
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      CALL UGEN(Z1F,Z1R,TDES(IA,N,2))                                   MD 03670
 1101 CONTINUE                                                          MD 03680
C                                                                       MD 03690
C     DO ZONE 2                                                         MD 03700
C                                                                       MD 03710
      DO 1102 N= 1,NZN2                                                 MD 03720
      CALL UGEN(Z2F,Z2R,TDES(IA,(NZN1+N),2))                            MD 03730
 1102 CONTINUE                                                          MD 03740
C                                                                       MD 03750
C     DO ZONE 3                                                         MD 03760
C                                                                       MD 03770
      DO 1103 N= 1,NZN3                                                 MD 03780
      CALL UGEN(Z3F,Z3R,TDES(IA,(NZN1+NZN2+N),2))                       MD 03790
 1103 CONTINUE                                                          MD 03800
      GO TO 6000                                                        MD 03810
C                                                                       MD 03820
C     TARGET IS SIZE CAT II                                             MD 03830
C                                                                       MD 03840
 100  CALL UGEN(PRDATA(3,1,9,1),PRDATA(3,1,9,2),SNO)                    MD 03850
      CALL TNGEN(PRDATA(3,1,5,1),PRDATA(3,1,5,2),PRDATA(3,1,5,3),       MD 03860
     2PRDATA(3,1,5,4),SLAT)                                             MD 03870
      CALL TNGEN(PRDATA(3,1,6,1),PRDATA(3,1,6,2),PRDATA(3,1,6,3),       MD 03880
     2PRDATA(3,1,6,4),ZONE1)                                            MD 03890
      CALL TNGEN(PRDATA(3,1,7,1),PRDATA(3,1,7,2),PRDATA(3,1,7,3),       MD 03900
     2PRDATA(3,1,7,4),ZONE2)                                            MD 03910
      CALL TNGEN(PRDATA(3,1,8,1),PRDATA(3,1,8,2),PRDATA(3,1,8,3),       MD 03920
     2PRDATA(3,1,8,4),ZONE3)                                            MD 03930
      TGT(ISOK,23)= 2.0                                                 MD 03940
      NPERS= SNO                                                        MD 03950
      GO TO 5000                                                        MD 03960
 6000 RETURN                                                            MD 03970
      END                                                               MD 03980

      SUBROUTINE TOANAL                                                 ME 00010
C                                                                       ME 00020
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         ME 00030
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  ME 00040
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   ME 00050
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   ME 00060
     2XTLETH ,STAT(20,4)                                                ME 00070
C                                                                       ME 00080
      DIMENSION PROF(3)                                                 ME 00090
      NFV=1                                                             ME 00100
      IQ=0                                                              ME 00110
      IKV=0                                                             ME 00120
C                                                                       ME 00130
C     GET BASIC DATA                                                    ME 00140
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C                                                                         ME 00150
      ITT=CEVENT(21)                                                      ME 00160
      IUNIT=CEVENT(8)                                                     ME 00170
      ISUN=CEVENT(9)                                                      ME 00180
      INT=CEVENT(4)                                                       ME 00190
      IS=IROW                                                             ME 00200
      DO 1000 I=1,3                                                       ME 00210
 1000 PROF(I)=0.0                                                         ME 00220
      DO 1650 J=1,3                                                       ME 00230
      IF(ARDATA(J,7,2) .EQ. 1 .AND. RANGE(CEVENT(6),CEVENT(7),J) .LT.     ME 00240
     2RMAX) PROF(J)= 1.0                                                  ME 00250
 1650 CONTINUE                                                            ME 00260
      WRITE(6,10402) PROF                                                 ME 00270
C                                                                         ME 00280
C     CHECK TO SEE IF TARGET IS TARGET OF OPPORTUNITY                     ME 00290
C                                                                         ME 00300
      IF(ITT .NE. 1) GO TO 6100                                           ME 00310
C                                                                         ME 00320
C     TARGET IS TARGET OF OPPORTUNITY                                     ME 00330
C                                                                         ME 00340
C     CHECK TO SEE IF ADJUSTMENT WILL BE CONDUCTED                        ME 00350
C                                                                         ME 00360
      CALL UNIF(RNNR)                                                     ME 00370
      IF(RNNR .GE. .3) GO TO 1290                                         ME 00380
C                                                                         ME 00390
C     WILL FIRE FOR EFFECT IMMEDIATELY                                    ME 00400
C                                                                         ME 00410
C     COMMIT ALL UNITS                                                    ME 00420
C                                                                         ME 00430
      ICHK=0                                                              ME 00440
      DO 3150 I=1,3                                                       ME 00450
      IF(PROF(I) .EQ. 0) GO TO 3150                                       ME 00460
      ICHK= ICHK+1                                                        ME 00470
      ARDATA(K,7,2)= 2.0                                                  ME 00480
      ARDATA(K,7,14)= 1.0                                                 ME 00490
      EVLIST(IROW,(37+K))= 1.0                                            ME 00500
 3150 CONTINUE                                                            ME 00510
      IF(ICHK .EQ. 0) GO TO 6000                                          ME 00520
C                                                                         ME 00530
C     UNITS ARE AVAILABLE AND HAVE BEEN COMMITTED                         ME 00540
C                                                                         ME 00550
      CALL STRAT(PROF,1,5)                                                ME 00560
      EVLIST(IROW,16)= 1.0                                                ME 00570
C                                                                         ME 00580
C     DETERMINE THE TARGET ANALYSIS TIME                                  ME 00590
C                                                                         ME 00600
      CALL TNGEN(PRDATA(2,4,4,1),PRDATA(2,4,4,2),PRDATA(2,4,4,3),         ME 00610
     2PRDATA(2,4,4,4),AC)                                                 ME 00620
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C
C     DETERMINE THE TIME FOR THE FDC TO SELECT MASS POINT
C
      CALL TNGEN(PRDATA(2,4,8,1),PRDATA(2,4,8,2),PRDATA(2,4,8,3),
     2PRDATA(2,4,8,4),AMP)
      CALL TNGEN(PRDATA(2,4,9,1),PRDATA(2,4,9,2),PRDATA(2,4,9,3),
     2PRDATA(2,4,9,4),APR)
      EVLIST(IROW,1)= CTIME+AC+AMP+APR
      EVLIST(IROW,2)= 2.
      RETURN
1290  CONTINUE
      TGT(INT,30)= 1.0
C
C     SEE IF CENTER BATTERY IS AVAILABLE
C
100   IF(PROF(2) .NE. 1) GO TO 1700
C
C     BATTERY IS AVAILABLE
C
      IBAT=2
      GO TO 2000
C
C     CENTER BATTERY IS NOT AVAILABLE
C
C     CHECK THE BATTERY ON UNIT SIDE OF THE BATTLE ZONE
C
1700  CONTINUE
      IF(IUNIT .GT. 2) ISIDE=3
      IF(IUNIT .GT. 2) IOPP=1
      IF(IUNIT .LE. 2) ISIDE=1
      IF(IUNIT .LE. 2) IOPP=3
      IF(PROF(ISIDE) .NE. 1) GO TO 1710
      IBAT=ISIDE
      GO TO 2000
C
C     CHECK UNIT ON OPPOSITE SIDE IF NECESSARY
C
1710  CONTINUE
      IF(PROF(IOPP) .NE. 1) GO TO 6000
      IBAT=IOPP
C
C     UNIT "IBAT" IS AVAILABLE AND IN RANGE
C     COMMIT THE ARTILLERY BATTERY FOR THE ADJUSTMENT
C
2000  EVLIST(IROW,9)= 1.*IBAT
      EVLIST(IROW,34)= 1.*IBAT
      TGT(INT,28)= 1.*IBAT
      TGT(INT,29)= RANGE(CEVENT(6),CEVENT(7),IBAT)
```

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C                                                                       ME 01110
C     COMMIT ALL UNCOMMITTED UNITS IN RANGE                             ME 01120
C                                                                       ME 01130
      DO 2010 K=1,3                                                     ME 01140
      IF(PROF(K) .EQ. 0) GO TO 2010                                     ME 01150
      ARDATA(K,7,2)= 2.0                                                ME 01160
      ARDATA(K,7,14)= 1.0                                               ME 01170
      EVLIST(IROW,(37+K))= 1.0                                          ME 01180
2010  CONTINUE                                                          ME 01190
C                                                                       ME 01200
C     DETERMINE TARGET ANALYSIS TIME.                                   ME 01210
C                                                                       ME 01220
      CALL TNGEN(PRDATA(2,4,4,1),PRDATA(2,4,4,2),PRDATA(2,4,4,3),       ME 01230
     2PRDATA(2,4,4,4),ANTIME)                                           ME 01240
C                                                                       ME 01250
C     DETERMINE TIME FOR ADJUSTING UNIT TO PREPARE AND FIRE THE INITIALME 01260
C     VOLLEY IN ADJUSTMENT                                              ME 01270
C                                                                       ME 01280
      CALL TNGEN(PRDATA(2,4,5,1),PRDATA(2,4,5,2),PRDATA(2,4,5,3),       ME 01290
     2PRDATA(2,4,5,4),TO)                                               ME 01300
C                                                                       ME 01310
C     SET UP THE ADJUSTMENT SEQUENCE                                    ME 01320
C                                                                       ME 01330
      EVLIST(IROW,1)= CTIME+ANTIME+TO                                   ME 01340
      EVLIST(IROW,(IBAT+9))= 2.0                                        ME 01350
      EVLIST(IROW,2)= 2.                                                ME 01360
      RETURN                                                            ME 01370
C                                                                       ME 01380
C     NO UNITS ARE AVAILABLE, SEE IF SUPPORTING UNIT IS AVAILABLE       ME 01390
C                                                                       ME 01400
6000  CONTINUE                                                          ME 01410
      IF(SUP(1) .NE. 0) GO TO 1709                                      ME 01420
      CALL SGAGE                                                        ME 01430
      RETURN                                                            ME 01440
C                                                                       ME 01450
C     SUPPORTING UNIT NOT AVAILABLE                                     ME 01460
C                                                                       ME 01470
1709  IQ=1                                                              ME 01480
      CALL QUE(IQ)                                                      ME 01490
      RETURN                                                            ME 01500
C                                                                       ME 01510
C     SEE IF TARGET IS PREP TARGET                                      ME 01520
C                                                                       ME 01530
6100  CONTINUE                                                          ME 01540
      IF(ITT .NE. 2) GO TO 8000                                         ME 01550
C                                                                       ME 01560
C     TARGET IS PREP TARGET                                             ME 01570
C                                                                       ME 01580
```

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C                                                                       ME 01590
C     SEE IF TARGET IS IN AREA                                          ME 01600
C                                                                       ME 01610
      CALL UNIF(RNNR)                                                   ME 01620
      IF(RNNR .GT. .3) GO TO 4150                                       ME 01630
C                                                                       ME 01640
C     TARGET EXISTS                                                     ME 01650
C                                                                       ME 01660
      CALL DARRAY(I)                                                    ME 01670
      EVLIST(IROW,5)= 1.*I                                              ME 01680
      CALL DESTGT(I,INT,IS)                                             ME 01690
      GO TO 3900                                                        ME 01700
C                                                                       ME 01710
C     TARGET DOES NOT EXIST                                             ME 01720
C                                                                       ME 01730
4150  EVLIST(IROW,5)= 100.                                              ME 01740
3900  CONTINUE                                                          ME 01750
C                                                                       ME 01760
C     SEE IF SCHEDULED UNIT IS AVAILABLE                                ME 01770
C                                                                       ME 01780
      KSTAT= ARDATA(ISUN,7,2)                                           ME 01790
      GO TO (4100,4200,4200),KSTAT                                      ME 01800
C                                                                       ME 01810
C     UNIT IS AVAILABLE                                                 ME 01820
C                                                                       ME 01830
4100  ARDATA(ISUN,7,2)= 2.0                                             ME 01840
      ARDATA(ISUN,7,14)= 2.0                                            ME 01850
      EVLIST(IROW,34)= 1.*ISUN                                          ME 01860
      EVLIST(IROW,(37+ISUN))= 1.0                                       ME 01870
      TGT(INT,11)= 1.*ISUN                                              ME 01880
      TGT(INT,37)= CTIME                                                ME 01890
      TGT(INT,31)= 1.0                                                  ME 01900
      TGT(INT,32)= 1.0                                                  ME 01910
      IST=2                                                             ME 01920
      CALL STRAT(PROF,ISUN,IST)                                         ME 01930
      RETURN                                                            ME 01940
C                                                                       ME 01950
C     UNIT IS NOT AVAILABLE, SEE IF ANOTHER IS AVAILABLE                ME 01960
C                                                                       ME 01970
4200  ISUN=0                                                            ME 01980
      DO 4250 K=1,3                                                     ME 01990
      IF(PROF(K) .NE. 1) GO TO 4250                                     ME 02000
      ISUN=K                                                            ME 02010
4250  CONTINUE                                                          ME 02020
      IF(ISUN .NE. 0) GO TO 4100                                        ME 02030
      IQ=2                                                              ME 02040
      IF(SUP(1) .NE. 0) GO TO 4260                                      ME 02050
      CALL SGAGE                                                        ME 02060
      RETURN
```

```
 4260 CALL QUE(IQ)                                                      ME 02070
      RETURN                                                            ME 02080
C                                                                       ME 02090
C     TARGET IS SCHEDULED                                               ME 02100
C                                                                       ME 02110
C     SEE IF SCHEDULED UNIT IS AVAILABLE                                ME 02120
C                                                                       ME 02130
 8000 CONTINUE                                                          ME 02140
      IF(PROF(ISUN) .NE. 1) GO TO 8011                                  ME 02150
C                                                                       ME 02160
C     UNIT IS AVAILABLE                                                 ME 02170
C                                                                       ME 02180
      IBAT=ISUN                                                         ME 02190
      GO TO 8050                                                        ME 02200
C                                                                       ME 02210
C     UNIT IS NOT AVAILABLE CHOOSE ONE OF OTHER UNITS                   ME 02220
C                                                                       ME 02230
 8011 CONTINUE                                                          ME 02240
 8010 DO 8060 J=1,3                                                     ME 02250
      IF(PROF(J) .EQ. 1) GO TO 8075                                     ME 02260
 8060 CONTINUE                                                          ME 02270
C                                                                       ME 02280
C     NO UNIT AVAILABLE, CHECK SUPPORTING UNIT                          ME 02290
C                                                                       ME 02300
      IF(SUP(1) .EQ. 1) GO TO 8401                                      ME 02310
C     SUPPORTED UNIT IS AVAILABLE                                       ME 02320
      CALL SGAGE                                                        ME 02330
      RETURN                                                            ME 02340
 8075 IBAT=J                                                            ME 02350
C                                                                       ME 02360
C     SEE IF SAFE TO FIRE                                               ME 02370
C                                                                       ME 02380
 8050 IF(CEVENT(7) .GT. GDATA(IUNIT,13)) GO TO 8097                     ME 02390
C                                                                       ME 02400
C     TARGET IS UNSAFE                                                  ME 02410
C                                                                       ME 02420
      CALL WD400(INT)                                                   ME 02430
      RETURN                                                            ME 02440
C     TARGET IS SAFE                                                    ME 02450
C                                                                       ME 02460
C     SEE IF THERE IS A TARGET THERE                                    ME 02470
C                                                                       ME 02480
 8097 CALL UNIF(RNNR)                                                   ME 02490
      TGT(INT,37)= CTIME                                                ME 02500
      IF(RNNR .GT. .3) GO TO 8096                                       ME 02510
C                                                                       ME 02520
C     TARGET EXISTS                                                     ME 02530
C                                                                       ME 02540
```

```
      CALL DARRAY(I)                                                    ME 02550
      EVLIST(IROW,5)= 1.*I                                              ME 02560
      CALL DESTGT(I,INT,IS)                                             ME 02570
      GO TO 8400                                                        ME 02580
C                                                                       ME 02590
C     TARGET DOES NOT EXIST                                             ME 02600
C                                                                       ME 02610
8096  EVLIST(IROW,5)= 100.                                              ME 02620
8400  IF(IKV .EQ. 0) GO TO 8300                                         ME 02630
C                                                                       ME 02640
C     TARGET GOES TO THE QUE                                            ME 02650
C                                                                       ME 02660
8401  IQ=4                                                              ME 02670
      NEV=1                                                             ME 02680
      CALL QUE(IQ)                                                      ME 02690
      RETURN                                                            ME 02700
8300  ARDATA(IBAT,7,2)= 2.                                              ME 02710
      ARDATA(IBAT,7,14)= 4.                                             ME 02720
      EVLIST(IROW,(9+IBAT))= 1.0*NGUNS                                  ME 02730
      EVLIST(IROW,34)= 1.*IBAT                                          ME 02740
      EVLIST(IROW,(37+IBAT))= 1.0                                       ME 02750
      IST=4                                                             ME 02760
      TGT(INT,11)= 1.*IBAT                                              ME 02770
      CALL STRAT(PROF,IBAT,IST)                                         ME 02780
9000  RETURN                                                            ME 02790
      END                                                               ME 02800


      SUBROUTINE ADJUST                                                 MF 00010
C                                                                       MF 00020
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MF 00030
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MF 00040
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MF 00050
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MF 00060
     2XTLETH ,STAT(20,4)                                                MF 00070
      DIMENSION PROF(3)                                                 MF 00080
C                                                                       MF 00090
      IR= EVLIST(IROW,4)                                                MF 00100
      DO 100 J=1,3                                                      MF 00110
100   PROF(J)= 0.0                                                      MF 00120
      IUN= EVLIST(IROW,34)                                              MF 00130
      DO 1050 J=1,3                                                     MF 00140
      IF(RANGE(CEVENT(6),CEVENT(7),J) .LE. RMAX .AND. EVLIST(IROW,      MF 00150
     2(37+J)) .EQ. 1) PROF(J)= 1.0                                      MF 00160
1050  CONTINUE                                                          MF 00170
C                                                                       MF 00180
C     SEE IF ADJUSTMENT WILL CONTINUE                                   MF 00190
C                                                                       MF 00200
```

```
      IF(EVLIST(IROW,16) .EQ. 1) GO TO 1000                             MF 00210
C                                                                       MF 00220
C     ADJUSTMENT CONTINUES                                              MF 00230
C                                                                       MF 00240
      TGT(IR,30)= TGT(IR,30)+1                                          MF 00250
      IF(RANGE(CEVENT(6),CEVENT(7),IUN) .GT. RMAX) GO TO 1199           MF 00260
C                                                                       MF 00270
C     DETERMINE TIME FOR FO TO MAKE ADJUSTMENT CORRECTION AND TRANSMIT  MF 00280
C     TO FDC                                                            MF 00290
C                                                                       MF 00300
5100  CONTINUE                                                          MF 00310
      CALL TNGEN(PRDATA(2,4,6,1),PRDATA(2,4,6,2),PRDATA(2,4,6,3),       MF 00320
     2PRDATA(2,4,6,4),AT)                                               MF 00330
C                                                                       MF 00340
C     DETERMINE TIME FOR FDC TO COMPUTE NEW FIRING DATA AND             MF 00350
C     TRANSMIT TO UNIT                                                  MF 00360
C                                                                       MF 00370
      CALL TNGEN(PRDATA(2,4,7,1),PRDATA(2,4,7,2),PRDATA(2,4,7,3),       MF 00380
     2PRDATA(2,4,7,4),AC)                                               MF 00390
C                                                                       MF 00400
C     DETERMINE TIME FOR UNIT TO PREPARE AND FIRE ROUNDS                MF 00410
C                                                                       MF 00420
      CALL TNGEN(PRDATA(2,4,5,1),PRDATA(2,4,5,2),PRDATA(2,4,5,3),       MF 00430
     2PRDATA(2,4,5,4),AF)                                               MF 00440
      EVLIST(IROW,1)= EVLIST(IROW,1)+AT+AC+AF                           MF 00450
      EVLIST(IROW,2)= 2.                                                MF 00460
      GO TO 6000                                                        MF 00470
C                                                                       MF 00480
C     ADJUSTMENT IS FINISHED                                            MF 00490
C                                                                       MF 00500
1000  CALL STRAT(PROF,1,1)                                              MF 00510
      GO TO 6000                                                        MF 00520
C                                                                       MF 00530
C     FIND ANOTHER UNIT TO CONTINUE THE ADJUSTMENT                      MF 00540
C                                                                       MF 00550
1199  CONTINUE                                                          MF 00560
1200  IF(CEVENT(6) .GE. GDATA(5,3) .AND. CEVENT(6) .LE. GDATA(5,5))     MF 00570
     2GO TO 1210                                                        MF 00580
      ISIDE= 3                                                          MF 00590
      GO TO 1220                                                        MF 00600
1210  ISIDE= 1                                                          MF 00610
1220  IF(PROF(ISIDE) .EQ. 1 .AND. ISIDE .NE. IUN) GO TO 1250            MF 00620
      IF(ISIDE .EQ. 1) NSIDE= 3                                         MF 00630
      IF(ISIDE .EQ. 3) NSIDE= 1                                         MF 00640
      IF(PROF(NSIDE) .EQ. 1 .AND. NSIDE .NE. IUN)GO TO 1260             MF 00650
C                                                                       MF 00660
C     NO UNIT AVAILABLE                                                 MF 00670
C                                                                       MF 00680
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      IF(SUP(1) .EQ. 1) GO TO 1699                                      MF 00690
      CALL SGAGE                                                        MF 00700
      RETURN                                                            MF 00710
 1699 CONTINUE                                                          MF 00720
 1700 DO 1230 J=1,3                                                     MF 00730
      IF(EVLIST(IROW,(37+J)) .EQ. 0) GO TO 1230                         MF 00740
      EVLIST(IROW,(9+J))= 0.0                                           MF 00750
      ARDATA(J,7,2)= 1.0                                                MF 00760
      ARDATA(J,7,14)= 0.0                                               MF 00770
 1230 CONTINUE                                                          MF 00780
      EVLIST(IROW,34) = 0.0                                             MF 00790
      IK=1                                                              MF 00800
      NEV=1                                                             MF 00810
      CALL QUE(IK)                                                      MF 00820
      GO TO 6000                                                        MF 00830
 1250 EVLIST(IROW,34)= ISIDE*1.                                         MF 00840
      EVLIST(IROW,(9+IUN))= 0.0                                         MF 00850
C     EVLIST(IROW,(9+ISIDE))= 2.0                                       MF 00860
      PROF(IUN)= 0.0                                                    MF 00870
      GO TO 5000                                                        MF 00880
 1260 EVLIST(IROW,34)= NSIDE*1.                                         MF 00890
      EVLIST(IROW,(9+IUN))= 0.0                                         MF 00900
      EVLIST(IROW,(9+NSIDE))= 2.0                                       MF 00910
      PROF(IUN)= 0.0                                                    MF 00920
 5000 EVLIST(IROW,1)= EVLIST(IROW,1)+60.                                MF 00930
      GO TO 5100                                                        MF 00940
 6000 RETURN                                                            MF 00950
      END                                                               MF 00960


      SUBROUTINE STRAT(PROF,IBAT,ITYPE)                                 MF 00970
C                                                                       MF 00980
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MF 00990
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MF 01000
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MF 01010
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MF 01020
     2XTLETH ,STAT(20,4)                                                MF 01030
      DIMENSION PROF(3)                                                 MF 01040
C                                                                       MF 01050
      INT= EVLIST(IROW,4)                                               MF 01060
      NCOL=10                                                           MF 01070
      GO TO (100,200,6000,400,500),ITYPE                                MF 01080
  200 J=IBAT+21                                                         MF 01090
      EVLIST(IROW,J)= 0.0                                               MF 01100
      EVLIST(IROW,1)= CTIME+60                                          MF 01110
      EVLIST(IROW,(9+IBAT))= 1.*NGUNS                                   MF 01120
      EVLIST(IROW,2)= 2.                                                MF 01130
      GO TO 6000                                                        MF 01140
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100   CALL EVENT(10,NCOL,NVOL)                                          MF 01150
      TGT(INT,32)= 1.*NVOL                                              MF 01160
      DO 110 J=1,3                                                      MF 01170
      IF(PROF(J) .NE. 1) GO TO 110                                      MF 01180
      EVLIST(IROW,(21+J))= NVOL*1.                                      MF 01190
      EVLIST(IROW,(9+J))= 1.*NGUNS                                      MF 01200
      ARDATA(J,7,2)=2.0                                                 MF 01210
      ARDATA(J,7,14)= 1.                                                MF 01220
110   CONTINUE                                                          MF 01230
      CALL EVENT(11,NCOL,ISTRAT)                                        MF 01240
      TGT(INT,31)= 1.*ISTRAT                                            MF 01250
      EVLIST(IROW,25)= ISTRAT*1.                                        MF 01260
C                                                                       MF 01270
C     DETERMINE TIME FOR FO TO MAKE CORRECTIONS                         MF 01280
C                                                                       MF 01290
      CALL TNGEN(PRDATA(2,4,6,1),PRDATA(2,4,6,2),PRDATA(2,4,6,3),       MF 01300
     2PRDATA(2,4,6,4),AC)                                               MF 01310
C                                                                       MF 01320
C     DETERMINE TIME FOR FDC TO COMPUTE FIRING DATA AND TRANSMIT TO UNIMF 01330
C                                                                       MF 01340
      CALL TNGEN(PRDATA(2,4,8,1),PRDATA(2,4,8,2),PRDATA(2,4,8,3),       MF 01350
     2PRDATA(2,4,8,4),AT)                                               MF 01360
C                                                                       MF 01370
C     DETERMINE THE TIME FOR UNIT TO PREPARE AND FIRE THE INITIAL VOLLEMF 01380
C                                                                       MF 01390
      CALL TNGEN(PRDATA(2,4,9,1),PRDATA(2,4,9,2),PRDATA(2,4,9,3),       MF 01400
     2PRDATA(2,4,9,4),AF)                                               MF 01410
      EVLIST(IROW,1)= CTIME+AC+AT+AF                                    MF 01420
      EVLIST(IROW,2)= 2.                                                MF 01430
      GO TO 6000                                                        MF 01440
400   J= IBAT+21                                                        MF 01450
      CALL EVENT(12,NCOL,NVOL)                                          MF 01460
      TGT(INT,32)= 1.*NVOL                                              MF 01470
      EVLIST(IROW,J)= 1.*NVOL                                           MF 01480
      EVLIST(IROW,(IBAT+9))= 1.*NGUNS                                   MF 01490
      CALL EVENT(13,NCOL,ISTRAT)                                        MF 01500
      TGT(INT,31)= 1.*ISTRAT                                            MF 01510
      EVLIST(IROW,25)= 1.*ISTRAT                                        MF 01520
      EVLIST(IROW,1)= CTIME+60                                          MF 01530
      EVLIST(IROW,2)=2.                                                 MF 01540
      GO TO 6000                                                        MF 01550
500   CALL EVENT(10,NCOL,NVOL)                                          MF 01560
      DO 220 J=1,3                                                      MF 01570
      IF(PROF(J) .NE. 1) GO TO 220                                      MF 01580
      EVLIST(IROW,(21+J))= NVOL*1.                                      MF 01590
      EVLIST(IROW,(9+J))= 1.*NGUNS                                      MF 01600
      ARDATA(J,7,2)= 2.0                                                MF 01610
      ARDATA(J,7,14)= 1.0                                               MF 01620
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220   CONTINUE                                                          MF 01630
      CALL EVENT(11,NCOL,ISTRAT)                                        MF 01640
      EVLIST(IROW,25)= ISTRAT*1.                                        MF 01650
      TGT(INT,31)= 1.*ISTRAT                                            MF 01660
      TGT(INT,32)= 1.*NVOL                                              MF 01670
      EVLIST(IROW,32)= EVLIST(IROW,6)                                   MF 01680
      EVLIST(IROW,33)= EVLIST(IROW,7)                                   MF 01690
6000  RETURN                                                            MF 01700
      END                                                               MF 01710

      SUBROUTINE ENGAGE                                                 MF 01720
C                                                                       MF 01730
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MF 01740
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MF 01750
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MF 01760
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MF 01770
     2XTLETH ,STAT(20,4)                                                MF 01780
      DIMENSION PROF(3)                                                 MF 01790
C                                                                       MF 01800
C     GET BASIC DATA                                                    MF 01810
C                                                                       MF 01820
      ISTRAT= CEVENT(25)                                                MF 01830
C                                                                       MF 01840
C     SEE IF MISSION IS COMPLETED                                       MF 01850
C                                                                       MF 01860
      DO 100 J=22,24                                                    MF 01870
      IF(EVLIST(IROW,J) .NE. 0) GO TO 110                               MF 01880
100   CONTINUE                                                          MF 01890
C                                                                       MF 01900
C     MISSION IS COMPLETE                                               MF 01910
C                                                                       MF 01920
      IF(EVLIST(IROW,21) .EQ. 1) GO TO 101                              MF 01930
      IF(EVLIST(IROW,21) .NE. 1) GO TO 102                              MF 01940
101   CALL WD100                                                        MF 01950
      GO TO 1000                                                        MF 01960
102   CALL WD200                                                        MF 01970
      GO TO 1000                                                        MF 01980
C                                                                       MF 01990
C     MISSION CONTINUES, GET NEW AIMPOINT                               MF 02000
C                                                                       MF 02010
110   DIFE= PRDATA(3,2,ISTRAT,1)/2                                      MF 02020
      DIFN= PRDATA(3,2,ISTRAT,2)                                        MF 02030
      SLB1= CEVENT(32)-DIFE                                             MF 02040
      SLB2= CEVENT(32)+DIFE                                             MF 02050
      DB1= CEVENT(33)                                                   MF 02060
      DB2= CEVENT(33)+ DIFN                                             MF 02070
      CALL UGEN(SLB1,SLB2,EVLIST(IROW,6))                               MF 02080
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```
      CALL UGEN(DB1,DB2,EVLIST(IROW,7))
C
C     PERFORM A RANGE CHECK
C
      ICOUNT=0
      DO 200 I=1,3
      IF(RANGE(EVLIST(IROW,6),EVLIST(IROW,7),I) .LT. RMAX
     2 .AND. EVLIST(IROW,(37+I)) .EQ. 1) GO TO 300
      EVLIST(IROW,(9+I))= 0.0
      GO TO 200
300   EVLIST(IROW,(9+I))= 1.*NGUNS
      ICOUNT=ICOUNT+1
200   CONTINUE
      IF(ICOUNT .EQ. 0) GO TO 110
      IF(ISTRAT .EQ. 1) GO TO 500
C
C     AIMPOINT CHANGES
C
C
C     DETERMINE THE TIME FOR FDC TO SELECT NEW AIM POINT, COMPUTE FIRIN
C     DATA AND TRANSMIT FIRE COMMANDS TO FIRE UNITS
C
      CALL TNGEN(PRDATA(2,4,8,1),PRDATA(2,4,8,2),PRDATA(2,4,8,3),
     2PRDATA(2,4,8,4),AT)
C
C     DETERMINE TIME FOR FIRE UNITS TO PREPARE AND FIRE THE VOLLEY
C
      CALL TNGEN(PRDATA(2,4,9,1),PRDATA(2,4,9,2),PRDATA(2,4,9,3),
     2PRDATA(2,4,9,4),AF)
      EVLIST(IROW,1)= CTIME+AT+AF
      EVLIST(IROW,2)= 2.
      GO TO 8000
C
C     AIMPOINT DOES NOT CHANGE
C
C     DETERMINE TIME FOR FIRE UNIT TO PREPARE AND FIRE ANOTHER VOLLEY
C
500   CALL TNGEN(PRDATA(2,4,10,1),PRDATA(2,4,10,2),PRDATA(2,4,10,3),
     2PRDATA(2,4,10,4),TDIF)
      EVLIST(IROW,1)= CTIME+TDIF
      EVLIST(IROW,2)= 2.
8000  CONTINUE
      RETURN
C
C     CHECK THE QUEUE
C
1000  DO 1100 J=1,4
      IF(Q(J) .EQ. 0) GO TO 1100
```

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      CALL DQUE(J)                                                      MF 02570
      GO TO 6000                                                        MF 02580
 1100 CONTINUE                                                          MF 02590
 6000 RETURN                                                            MF 02600
      END                                                               MF 02610


      SUBROUTINE SHOOT                                                  MF 02620
C                                                                       MF 02630
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MF 02640
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MF 02650
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MF 02660
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MF 02670
     2XTLETH ,STAT(20,4)                                                MF 02680
C                                                                       MF 02690
      DIMENSION TOF(3)                                                  MF 02700
      INT= EVLIST(IROW,4)                                               MF 02710
      DO 500 I=1,3                                                      MF 02720
  500 TOF(I)= 0.0                                                       MF 02730
      DO 100 I=1,3                                                      MF 02740
      IF(EVLIST(IROW,(21+I)) .GT. 0) EVLIST(IROW,(21+I))= EVLIST(IROW,  MF 02750
     2(21+I))-1                                                         MF 02760
      RAN= RANGE(CEVENT(6),CEVENT(7),I)                                 MF 02770
      CALL FIPAR(RAN,EVLIST(IROW,(25+I)),EVLIST(IROW,(28+I)),TOF(I))    MF 02780
  100 CONTINUE                                                          MF 02790
      EVLIST(IROW,1)= CTIME+AMAX1(TOF(1),TOF(2),TOF(3))                 MF 02800
      EVLIST(IROW,2)= 3.0                                               MF 02810
      DO 300 I=1,3                                                      MF 02820
  300 ARDATA(I,7,13)= ARDATA(I,7,13)+ EVLIST(IROW,(9+I))                MF 02830
      DO 400 I=10,12                                                    MF 02840
  400 EVLIST(IROW,35)= EVLIST(IROW,35)+ EVLIST(IROW,I)                  MF 02850
      GO TO 6000                                                        MF 02860
 6000 DO 1000 I=10,12                                                   MF 02870
 1000 TGT(INT,13)= TGT(INT,13)+EVLIST(IROW,I)                           MF 02880
      RETURN                                                            MF 02890
      END                                                               MF 02900


      SUBROUTINE FIPAR(RAN  ,RERROR,DERROR,TOF)                         MF 02910
C                                                                       MF 02920
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MF 02930
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MF 02940
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MF 02950
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MF 02960
     2XTLETH ,STAT(20,4)                                                MF 02970
C                                                                       MF 02980
      INDEX= RAN/500                                                    MF 02990
C                                                                       MF 03000
```

```
C     FIND MIN RANGE ERROR VARIATION                                    MF 03010
C                                                                       MF 03020
      SMRE= 500.                                                        MF 03030
      DO 100 I=1,NCHGS                                                  MF 03040
      RER= FD105(I,INDEX,1)+(RAN  -INDEX*500)*(FD105(I,(INDEX+1),1)-FD1 MF 03050
     205(I,INDEX,1))/500                                                MF 03060
      IF (RER .GT. SMRE) GO TO 100                                      MF 03070
      SMRE= RER                                                         MF 03080
      ICHG= I                                                           MF 03090
100   CONTINUE                                                          MF 03100
      RERROR= (SMRE/1.414)**2                                           MF 03110
C                                                                       MF 03120
C     FIND DEF ERROR VARIATION                                          MF 03130
C                                                                       MF 03140
      DER= FD105(ICHG,INDEX,2)+(RAN  -INDEX*500)*(FD105(ICHG,(INDEX+1), MF 03150
     22)-FD105(ICHG,INDEX,2))/500                                       MF 03160
      DERROR= (DER/1.414)**2                                            MF 03170
C                                                                       MF 03180
C     FIND TOF                                                          MF 03190
C                                                                       MF 03200
      TOF= FD105(ICHG,INDEX,3)+(RAN  -INDEX*500)*(FD105(ICHG,(INDEX+1), MF 03210
     3 3)-FD105(ICHG,INDEX,3))/500                                      MF 03220
      RETURN                                                            MF 03230
      END                                                               MF 03240


      SUBROUTINE DAMAGE                                                 MF 03250
C                                                                       MF 03260
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MF 03270
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MF 03280
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MF 03290
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MF 03300
     2XTLETH ,STAT(20,4)                                                MF 03310
      INTEGER HB,HF,H                                                   MF 03320
C                                                                       MF 03330
      IF(CEVENT(5) .EQ. 100 ) GO TO 2000                                MF 03340
      SMBN= 0.0                                                         MF 03350
      SMBE= 0.0                                                         MF 03360
      INT= EVLIST(IROW,4)                                               MF 03370
      DO 100 I=1,3                                                      MF 03380
      IF (CEVENT(9+I) .EQ. 0) GO TO 100                                 MF 03390
      NR= CEVENT(9+I)                                                   MF 03400
      ARG= (CEVENT(6)-ARDATA(I,7,7))/(CEVENT(7)-ARDATA(I,7,8))          MF 03410
      GTA= ATAN(ARG)                                                    MF 03420
      TRANGE= RANGE(CEVENT(6),CEVENT(7),I)                              MF 03430
      IF(NR.EQ.2) GO TO 150                                             MF 03440
      IF(NR.EQ.4) GO TO 151                                             MF 03450
      IF(NR.EQ.6) GO TO 152                                             MF 03460
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```
150     HB=3                                                            MF 03470
        HF=4                                                            MF 03480
        GO TO 210                                                       MF 03490
151     HB=2                                                            MF 03500
        HF=5                                                            MF 03510
        GO TO 210                                                       MF 03520
152     HB=1                                                            MF 03530
        HF=6                                                            MF 03540
210     DO 1700 J=HB,HF                                                 MF 03550
        CALL BPNT(TRANGE,GTA,I,J,BLOCE,BLOCN)                           MF 03560
        IF (NR .NE. 2) GO TO 700                                        MF 03570
        SMBN= SMBN+BLOCN                                                MF 03580
        SMBE= SMBE+ BLOCE                                               MF 03590
700     HO= CEVENT(5)                                                   MF 03600
        NUM= CEVENT(18)                                                 MF 03610
        DO 3000 H=1,NUM                                                 MF 03620
        IF(TDES(HO,H,1) .EQ. 0 .AND. TDES(HO,H,2) .EQ. 0) GO TO 3000    MF 03630
        ENT= DIST(BLOCE,BLOCN,TDES(HO,H,1),TDES(HO,H,2))                MF 03640
        IF(ENT .GT. 250) GO TO 3000                                     MF 03650
171     PKILL=EXP(-(ENT**2/XLETH**2))                                   MF 03660
        CALL UNIF(RNNR)                                                 MF 03670
        IF(RNNR .GT. PKILL) GO TO 3000                                  MF 03680
        EVLIST(IROW,13)= EVLIST(IROW,13)+1                              MF 03690
        TGT(INT,14)= TGT(INT,14)+1                                      MF 03700
        TDES(HO,H,1)= 0.0                                               MF 03710
        TDES(HO,H,2)= 0.0                                               MF 03720
3000    CONTINUE                                                        MF 03730
1700    CONTINUE                                                        MF 03740
100     CONTINUE                                                        MF 03750
C                                                                       MF 03760
C       HAVE NOW FINISHED ASSESSING THE ROUNDS                          MF 03770
C                                                                       MF 03780
        IF(EVLIST(IROW,16) .EQ. 1) GO TO 2000                           MF 03790
        SE= SMBE/2                                                      MF 03800
        SN= SMBN/2                                                      MF 03810
        CALL NAIMPT(SE,SN)                                              MF 03820
        CALL ADJUST                                                     MF 03830
        GO TO 6000                                                      MF 03840
2000    CALL ENGAGE                                                     MF 03850
6000    RETURN                                                          MF 03860
        END                                                             MF 03870


        SUBROUTINE BPNT(TRANGE,GTA,I,J,BLOCE,BLOCN)                     MG 00010
C                                                                       MG 00020
        COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,       MG 00030
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MG 00040
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MG 00050
```

```
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,  MG 00060
     2XTLETH ,STAT(20,4)                                                MG 00070
C                                                                       MG 00080
      CALL NGEN(0.0,CEVENT(25+I),ERNG)                                  MG 00090
      CALL NGEN(0.0,CEVENT(28+I),ERDEF)                                 MG 00100
C                                                                       MG 00110
C     DETERMINE BURST LOCATION IN WEAPON COORDINATE SYSTEM              MG 00120
C                                                                       MG 00130
      APTE= ARDATA(I,J,3)+TRANGE*SIN(GTA)                               MG 00140
      APTN= ARDATA(I,J,4)+TRANGE*COS(GTA)                               MG 00150
C     TRANSFORM COORDINATES TO BASE COORDINATE SYSTEM                   MG 00160
C                                                                       MG 00170
      BLOCE= ERDEF*COS(GTA)+ERNG*SIN(GTA)+APTE                          MG 00180
      BLOCN= ERNG*COS(GTA)-ERDEF*SIN(GTA)+APTN                          MG 00190
6000  RETURN                                                            MG 00200
      END                                                               MG 00210


      SUBROUTINE SHIFT(RE,DE,ME,MN)                                     MG 00220
C                                                                       MG 00230
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MG 00240
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MG 00250
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MG 00260
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,  MG 00270
     2XTLETH ,STAT(20,4)                                                MG 00280
      REAL ME,MN                                                        MG 00290
C                                                                       MG 00300
      IF (RE .GT. 800) MN= 1000.                                        MG 00310
      IF (RE .GT. 600 .AND. RE .LE. 800) MN= 800.                       MG 00320
      IF (RE .GT. 400 .AND. RE .LE. 600) MN= 600.                       MG 00330
      IF (RE .GT. 200 .AND. RE .LE. 400) MN= 400.                       MG 00340
      IF (RE .GT. 100 .AND. RE .LE. 200) MN= 200.                       MG 00350
      IF (RE .GT. 50 .AND. RE .LE. 100) MN= 100.                        MG 00360
      IF (RE .LE. 50) MN=0.0                                            MG 00370
      I= DE/10                                                          MG 00380
      ME= I*10                                                          MG 00390
      IF (RE .LT. 50 .AND. DE .LT. 50) GO TO 100                        MG 00400
      GO TO 6000                                                        MG 00410
100   EVLIST(IROW,16)= 1.0                                              MG 00420
      EVLIST(IROW,32)= CEVENT(6)                                        MG 00430
      EVLIST(IROW,33)= CEVENT(7)                                        MG 00440
6000  RETURN                                                            MG 00450
      END                                                               MG 00460
```

```
      SUBROUTINE NAIMPT(SE,SN)                                          MG 00470
C                                                                       MG 00480
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MG 00490
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MG 00500
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MG 00510
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MG 00520
     2XTLETH ,STAT(20,4)                                                MG 00530
      REAL ME,MN                                                        MG 00540
      REAL GTA                                                          MG 00550
C                                                                       MG 00560
      IR= CEVENT(4)                                                     MG 00570
      TLN= TGT(IR,4)                                                    MG 00580
      TLE= TGT(IR,3)                                                    MG 00590
      NUNIT= EVLIST(IROW,8)                                             MG 00600
C                                                                       MG 00610
C     DETERMINE THE ERROR IN DETERMINING THE APPARANT LOCATION OF THE   MG 00620
C     ROUNDS                                                            MG 00630
C                                                                       MG 00640
      ARG= (SE-GDATA(NUNIT,12))/(SN-GDATA(NUNIT,13))                    MG 00650
      GTA= ATAN(ARG)                                                    MG 00660
      RAN= DIST(TLN,TLE,GDATA(NUNIT,13),GDATA(NUNIT,12))                MG 00670
      VARDEF= PRDATA(2,5,4,1)+RAN*PRDATA(2,5,4,2)                       MG 00680
      VARRNG= PRDATA(2,5,5,1)+RAN*PRDATA(2,5,5,2)                       MG 00690
      CALL TNGEN(0.0,VARDEF,-PRDATA(2,5,4,4),PRDATA(2,5,4,4),TE)        MG 00700
      CALL TNGEN(0.0,VARRNG,-PRDATA(2,5,5,4),PRDATA(2,5,5,4),TN)        MG 00710
C                                                                       MG 00720
C     TRANSFORM THE COORDINATES                                         MG 00730
C                                                                       MG 00740
      ERE= TE*COS(GTA)+TN*SIN(GTA)                                      MG 00750
      ERN= TN*COS(GTA)-TE*SIN(GTA)                                      MG 00760
      ABE= SE+ERE                                                       MG 00770
      ABN= SN+ERN                                                       MG 00780
C                                                                       MG 00790
C     DETERMINE TARGET LOCATION IN FO COORDINATE SYSTEM                 MG 00800
C                                                                       MG 00810
      TL1E= TLE-GDATA(NUNIT,12)                                         MG 00820
      TL1N= TLN-GDATA(NUNIT,13)                                         MG 00830
      GTA= EVLIST(IROW,43)                                              MG 00840
      TLEFO= TL1E*COS(GTA)-TL1N*SIN(GTA)                                MG 00850
      TLNFO= TL1N*COS(GTA)+TL1E*SIN(GTA)                                MG 00860
C                                                                       MG 00870
C     DETERMINE COORDINATES OF APPARANT LOCATION OF BURST IN FO         MG 00880
C     COORDINATE SYSTEM                                                 MG 00890
C                                                                       MG 00900
      AB1E= ABE-GDATA(NUNIT,12)                                         MG 00910
      AB1N= ABN-GDATA(NUNIT,13)                                         MG 00920
      ABEFO= AB1E*COS(GTA)-AB1N*SIN(GTA)                                MG 00930
      ABNFO= AB1N*COS(GTA)+AB1E*SIN(GTA)                                MG 00940
```

```
C
C     DETERMINE THE SHIFT REQUIRED
C
      DE= ABS(TLEFO-ABEFO)
      RE= ABS(TLNFO-ABNFO)
      CALL SHIFT(RE,DE,ME,MN)
      IF(ABEFO .GT. TLEFO) GO TO 110
      XE= ME
      GO TO 120
110   XE=-ME
120   IF(ABNFO .GT. TLNFO) GO TO 130
      XN= MN
      GO TO 500
130   XN=-MN
C
C     TRANSFORM NEW AIMPOINT IN FO COORDINATE SYSTEM TO BASE
C     COORDINATE SYSTEM
C
500   CONTINUE
      SEB= XE*COS(GTA)+XN*SIN(GTA)
      SNB= XN*COS(GTA)-XE*SIN(GTA)
      EVLIST(IROW,6)= EVLIST(IROW,6)+ SEB
      EVLIST(IROW,7)= EVLIST(IROW,7)+SNB
6000  RETURN
      END


      SUBROUTINE NGEN (R,S,RESULT)
C
      REAL GDATA, PRDATA, TGT
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,
     2XTLETH ,STAT(20,4)
C
      SUM=0.0
      DO 1000 I=1,12
      CALL UNIF (RN)
1000  SUM=SUM+RN
      RINT= SUM-6
      RESULT= RINT*SQRT(S)+R
      RETURN
      END
```

```
      SUBROUTINE TNGEN(SMN,SVAR,SLFT,SRGHT,SRES)                        MG 01370
C                                                                       MG 01380
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MG 01390
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MG 01400
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MG 01410
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MG 01420
     2XTLETH ,STAT(20,4)                                                MG 01430
C                                                                       MG 01440
100   CALL NGEN(SMN,SVAR,S)                                             MG 01450
      IF(S .GE. SLFT .AND. S .LE. SRGHT) GO TO 200                      MG 01460
      GO TO 100                                                         MG 01470
200   SRES=S                                                            MG 01480
      RETURN                                                            MG 01490
      END                                                               MG 01500


      SUBROUTINE UNIF (RN)                                              MG 01510
C                                                                       MG 01520
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MG 01530
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MG 01540
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MG 01550
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MG 01560
     2XTLETH ,STAT(20,4)                                                MG 01570
      REAL GDATA, PRDATA, TGT                                           MG 01580
      REAL MOD                                                          MG 01590
C                                                                       MG 01600
      MOD=2**31                                                         MG 01610
      NR=129*NU+1                                                       MG 01620
      RN= NR/MOD                                                        MG 01630
      IF (RN.LT.0.0)RN=-RN                                              MG 01640
      NU=NR                                                             MG 01650
      RETURN                                                            MG 01660
      END                                                               MG 01670


      SUBROUTINE UGEN(SLO,SAP,RESULT)                                   MG 01680
C                                                                       MG 01690
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MG 01700
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MG 01710
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MG 01720
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MG 01730
     2XTLETH ,STAT(20,4)                                                MG 01740
      REAL GDATA, PRDATA, TGT                                           MG 01750
C                                                                       MG 01760
      CALL UNIF (RNNR)                                                  MG 01770
      RESULT= SLO+((SAP-SLO)*RNNR)                                      MG 01780
      RETURN                                                            MG 01790
      END                                                               MG 01800
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      SUBROUTINE EVENT (NUNIT,ICOL,IRESLT)                              MG 01810
C                                                                       MG 01820
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MG 01830
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MG 01840
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MG 01850
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MG 01860
     2XTLETH ,STAT(20,4)                                                MG 01870
      REAL GDATA, PRDATA, TGT                                           MG 01880
      DIMENSION ARY(8)                                                  MG 01890
C                                                                       MG 01900
      DO 1700 I=1,8                                                     MG 01910
 1700 ARY(I)= 0.0                                                       MG 01920
      SUM= 0.0                                                          MG 01930
      DO 100 I=1,8                                                      MG 01940
      IF(NUNIT .NE. 10) GO TO 90                                        MG 01950
      SUM= SUM+ PRDATA(3,2,10,I)                                        MG 01960
      ARY(I)= SUM                                                       MG 01970
      GO TO 100                                                         MG 01980
   90 CONTINUE                                                          MG 01990
      IF(NUNIT .NE. 11) GO TO 91                                        MG 02000
      SUM= SUM+PRDATA(3,2,9,I)                                          MG 02010
      ARY(I)= SUM                                                       MG 02020
      GO TO 100                                                         MG 02030
   91 CONTINUE                                                          MG 02040
      IF(NUNIT .NE. 12) GO TO 92                                        MG 02050
      SUM= SUM+PRDATA(3,2,12,I)                                         MG 02060
      ARY(I)= SUM                                                       MG 02070
      GO TO 100                                                         MG 02080
   92 CONTINUE                                                          MG 02090
      IF(NUNIT .NE. 13) GO TO 93                                        MG 02100
      SUM= SUM+PRDATA(3,2,14,I)                                         MG 02110
      ARY(I)= SUM                                                       MG 02120
      GO TO 100                                                         MG 02130
   93 SUM= SUM+PRDATA(1,NUNIT,ICOL,I)                                   MG 02140
      ARY(I)= SUM                                                       MG 02150
  100 CONTINUE                                                          MG 02160
      CALL UNIF(RNNR)                                                   MG 02170
      IRESLT=0                                                          MG 02180
      IF(RNNR .GE. ARY(1)) GO TO 200                                    MG 02190
      IRESLT=1                                                          MG 02200
      GO TO 400                                                         MG 02210
  200 CONTINUE                                                          MG 02220
      DO 201 I=1,7                                                      MG 02230
      IF(RNNR .GE. ARY(I) .AND. RNNR .LT. ARY(I+1)) GO TO 202           MG 02240
      IF(ARY(I+1) .EQ. 1) GO TO 202                                     MG 02250
  201 CONTINUE                                                          MG 02260
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      GO TO 400                                                         MG 02270
202   IRESLT= I+1                                                       MG 02280
400   IF(NUNIT .NE. 10) GO TO 600                                       MG 02290
      IN= IRESLT                                                        MG 02300
      IRESLT= PRDATA(3,2,11,IN)                                         MG 02310
      RETURN                                                            MG 02320
600   CONTINUE                                                          MG 02330
      IF( NUNIT .NE. 12) GO TO 610                                      MG 02340
      IN= IRESLT                                                        MG 02350
      IRESLT= PRDATA(3,2,13,IN)                                         MG 02360
      RETURN                                                            MG 02370
610   CONTINUE                                                          MG 02380
      IF(NUNIT .GT. 7) RETURN                                           MG 02390
      IF(ICOL .NE. 6 .AND. ICOL .NE. 7) RETURN                          MG 02400
      IF(ICOL .EQ. 6) IR= 18                                            MG 02410
      IF(ICOL .EQ. 7) IR=19                                             MG 02420
      IN= IRESLT                                                        MG 02430
      IRESLT= PRDATA(1,NUNIT,IR,IN)                                     MG 02440
      RETURN                                                            MG 02450
      END                                                               MG 02460


      SUBROUTINE TNE                                                    MG 02470
C                                                                       MG 02480
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MG 02490
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MG 02500
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MG 02510
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MG 02520
     2XTLETH ,STAT(20,4)                                                MG 02530
C                                                                       MG 02540
      SMIN= 1000000.                                                    MG 02550
      DO 1000 I=1,250                                                   MG 02560
      IF (EVLIST(I,50) .EQ. 0) GO TO 1000                               MG 02570
      IF (EVLIST(I,1) .LT. SMIN) GO TO 1100                             MG 02580
1000  CONTINUE                                                          MG 02590
      GO TO 1300                                                        MG 02600
1100  SMIN= EVLIST(I,1)                                                 MG 02610
      IROW= I                                                           MG 02620
      GO TO 1000                                                        MG 02630
1300  DO 1200 J=1,50                                                    MG 02640
1200  CEVENT(J)= EVLIST(IROW,J)                                         MG 02650
      RETURN                                                            MG 02660
      END                                                               MG 02670
```

```
      SUBROUTINE SETUP                                                  MG 02680
C                                                                       MG 02690
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MG 02700
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MG 02710
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MG 02720
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MG 02730
     2XTLETH ,STAT(20,4)                                                MG 02740
      DIMENSION CFLL(2)                                                 MG 02750
C                                                                       MG 02760
      CTIME=0.0                                                         MG 02770
      TINC=0.0                                                          MG 02780
      TOPT=0.0                                                          MG 02790
      ITGT=0                                                            MG 02800
      SHOUR=0.0                                                         MG 02810
      IROW=0                                                            MG 02820
      J100= 1                                                           MG 02830
      J200= 1                                                           MG 02840
      DO 2501 I=1,7                                                     MG 02850
      DO 2501 J=1,20                                                    MG 02860
2501  GDATA(I,J)= 0.0                                                   MG 02870
      DO 1100 I=1,250                                                   MG 02880
      DO 1100 J=1,40                                                    MG 02890
1100  TGT(I,J)= 0.0                                                     MG 02900
      DO 1101 I=1,10                                                    MG 02910
      DO 1101 J=1,300                                                   MG 02920
      DO 1101 K=1,4                                                     MG 02930
1101  TDES(I,J,K)= 0.0                                                  MG 02940
      DO 1102 I=1,50                                                    MG 02950
1102  CEVENT(I)=0.0                                                     MG 02960
      DO 6310 I=1,250                                                   MG 02970
      DO 6310 J=1,50                                                    MG 02980
6310  EVLIST(I,J)=0.0                                                   MG 02990
      DO 1103 I=1,7                                                     MG 03000
1103  GDATA(I,2)= 1.0                                                   MG 03010
      DO 1104 I=1,4                                                     MG 03020
      DO 1104 J=1,7                                                     MG 03030
      DO 1104 K=1,16                                                    MG 03040
1104  ARDATA(I,J,K)= 0.0                                                MG 03050
      DO 1201 J=1,10                                                    MG 03060
1201  SUP(J)= 0.0                                                       MG 03070
      DO 2733 I=1,4                                                     MG 03080
      DO 2733 J=1,20                                                    MG 03090
      DO 2733 K=1,50                                                    MG 03100
2732  Q(I)=0.0                                                          MG 03110
2733  QUES(I,J,K)= 0.0                                                  MG 03120
      DO 1215 I=1,20                                                    MG 03130
      DO 1215 J=1,4                                                     MG 03140
1215  STAT(I,J)= 0.0                                                    MG 03150
```

```
C                                                                      MG 03160
C       LOCATE UNITS ON THE FEBA AND DEFINE THE OBJECTIVES             MG 03170
C                                                                      MG 03180
        DO 999 I=1,2                                                   MG 03190
        CALL  TNGEN(PRDATA(1,1,2,1),PRDATA(1,1,2,2),PRDATA(1,1,2,3),   MG 03200
     2PRDATA(1,1,2,4),CFLL(I))                                         MG 03210
999     CONTINUE                                                       MG 03220
        CALL  TNGEN(PRDATA(1,5,2,1),PRDATA(1,5,2,2),PRDATA(1,5,2,3),   MG 03230
     2PRDATA(1,5,2,4),BFL)                                             MG 03240
        CALL  TNGEN(PRDATA(1,7,2,1),PRDATA(1,7,2,2),PRDATA(1,7,2,3),   MG 03250
     2PRDATA(1,7,2,4),BDFL)                                            MG 03260
        GDATA (7,5) =BDFL                                              MG 03270
        GDATA(4,5)= BDFL                                               MG 03280
        GDATA (1,5)= CFLL(1)                                           MG 03290
        GDATA (3,5)= BFL+ CFLL(2)                                      MG 03300
        GDATA (2,5)= BFL                                               MG 03310
        GDATA(5,5)= BFL                                                MG 03320
        GDATA (6,5)= BDFL                                              MG 03330
        GDATA (2,3)= GDATA (1,5)                                       MG 03340
        GDATA (3,3)= BFL                                               MG 03350
        GDATA (4,3)= GDATA (3,5)                                       MG 03360
        GDATA (6,3)= BFL                                               MG 03370
        DO 1105 I=1,4
1105    EVLIST(I,50)= 1.0                                              MG 03390
        GDATA(1,1)=1.0                                                 MG 03400
        GDATA(2,1)=2.0                                                 MG 03410
        GDATA(3,1)=3.0                                                 MG 03420
        GDATA(4,1)=4.0                                                 MG 03430
        GDATA(5,1)=5.                                                  MG 03440
        GDATA(6,1)=6.0                                                 MG 03450
        GDATA(7,1)=7.0                                                 MG 03460
C                                                                      MG 03470
C       LOCATE OBJECTIVE CENTERS AND FIREPLANNING CENTER               MG 03480
C                                                                      MG 03490
C       LOCATE OBJECTIVES CENTERS                                      MG 03500
C                                                                      MG 03510
        DO 200 I=1,7                                                   MG 03520
        GDATA (I,12)= (GDATA (I,3)+GDATA(I,5))/2                       MG 03530
        GDATA (I,13)= (GDATA (I,4)+GDATA(I,6))/2                       MG 03540
        CALL  TNGEN(PRDATA(1,I,3,1),PRDATA(1,I,3,2),PRDATA(1,I,3,3),   MG 03550
     2PRDATA(1,I,3,4),DIS)                                             MG 03560
        GDATA (I,8)= (GDATA (I,4)+GDATA(I,6))/2+ DIS                   MG 03570
        GDATA(I,19)= GDATA(I,8)                                        MG 03580
        CALL  TNGEN(GDATA(I,12),PRDATA(1,I,17,2),GDATA(I,3),           MG 03590
     2GDATA(I,5),GDATA(I,7))                                           MG 03600
200     CONTINUE                                                       MG 03610
C                                                                      MG 03620
C       DEFINE ATTITUDE AND AXIS LENGTH FOR EACH OBJECTIVE             MG 03630
```

```
C                                                                       MG 03640
      DO 300 I=1,7                                                      MG 03650
      CALL TNGEN(PRDATA(1,I,4,1),PRDATA(1,I,4,2),PRDATA(1,I,4,3),       MG 03660
     2PRDATA(1,I,4,4),GDATA(I,9))                                       MG 03670
      CALL TNGEN(PRDATA(1,I,5,1),PRDATA(1,I,5,2),PRDATA(1,I,5,3),       MG 03680
     2PRDATA(1,I,5,4),GDATA(I,10))                                      MG 03690
      CALL UGEN(-.528,.528,GDATA(I,11))                                 MG 03700
      GO TO 300                                                         MG 03710
302   GDATA (I,11)= ANGLE                                               MG 03720
300   CONTINUE                                                          MG 03730
C                                                                       MG 03740
C     LOCATE BASE LINES FOR UNITS                                       MG 03750
C                                                                       MG 03760
      DO 9500 I=1,7                                                     MG 03770
9500  GDATA(I,17)= GDATA(I,12)                                          MG 03780
C                                                                       MG 03790
C     DO INITIAL FIRE PLANNING                                          MG 03800
C                                                                       MG 03810
      DO 1600 NUNIT= 1,7                                                MG 03820
      CALL FIPLAN (NUNIT)                                               MG 03830
1600  CONTINUE                                                          MG 03840
      CALL IALOC                                                        MG 03850
      CALL FIALOC(CTIME)                                                MG 03860
      CALL START                                                        MG 03870
      CALL IPROUT                                                       MG 03880
      RETURN                                                            MG 03890
      END                                                               MG 03900


      SUBROUTINE EXPON(RTIME)                                           MH 00010
C                                                                       MH 00020
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MH 00030
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MH 00040
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MH 00050
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MH 00060
     2XTLETH ,STAT(20,4)                                                MH 00070
C                                                                       MH 00080
      CALL UNIF(RNNR)                                                   MH 00090
      RTIME= -ALOG(RNNR)*EXMN                                           MH 00100
      RETURN                                                            MH 00110
      END                                                               MH 00120


      SUBROUTINE RDPAR                                                  MH 00130
C                                                                       MH 00140
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MH 00150
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MH 00160
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MH 00170
```

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      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MH 00180
     2XTLETH ,STAT(20,4)                                                MH 00190
C                                                                       MH 00200
C     ZERO ALL ARRAYS                                                   MH 00210
C                                                                       MH 00220
      DO 2500 I=1,3                                                     MH 00230
      DO 2500 IA=1,7                                                    MH 00240
      DO 2500 IB=1,20                                                   MH 00250
      DO 2500 IC=1,10                                                   MH 00260
2500  PRDATA(I,IA,IB,IC)= 0.0                                           MH 00270
      DO 2506 I= 1,4                                                    MH 00280
      DO 2506 J=1,50                                                    MH 00290
      DO 2506 K= 1,3                                                    MH 00300
2506  FD105(I,J,K)= 0.0                                                 MH 00310
      DO 1702 I=1,7                                                     MH 00320
1702  GDATA (I,2)= 1.0                                                  MH 00330
C                                                                       MH 00340
C     READ IN MANEUVER ELEMENT GEOMETRICAL AND MOVEMENT PARAMETERS      MH 00350
C                                                                       MH 00360
      READ(5,100) ((PRDATA(1,1,J,K),K=1,4),J=2,5)                       MH 00370
      READ(5,100) ((PRDATA(1,5,J,K),K=1,4),J=2,5)                       MH 00380
      READ(5,100) ((PRDATA(1,7,J,K),K=1,4),J=2,5)                       MH 00390
      READ(5,100) (PRDATA(1,1,16,K),K=1,2)                              MH 00400
      READ(5,100) PRDATA(1,1,17,2),PRDATA(1,5,17,2),PRDATA(1,7,17,2)    MH 00410
C                                                                       MH 00420
C     READ IN THE FIREPLANNING PARAMETERS                               MH 00430
C                                                                       MH 00440
      J=1                                                               MH 00450
1000  READ(5,101) (PRDATA(1,J,18,K),K=1,8),(PRDATA(1,J,6,K),K=1,8),     MH 00460
     2(PRDATA(1,J,19,K),K=1,8),(PRDATA(1,J,7,K),K=1,8),                 MH 00470
     3((PRDATA(1,J,K,L),L=1,8),K=8,15)                                  MH 00480
      IF(J .EQ. 1) IN=5                                                 MH 00490
      IF(J .EQ. 5) IN=7                                                 MH 00500
      IF(J .EQ. 7) GO TO 1100                                           MH 00510
      J=IN                                                              MH 00520
      GO TO 1000                                                        MH 00530
1100  DO 1200 J=2,4                                                     MH 00540
      DO 1200 K=2,20                                                    MH 00550
      DO 1200 L=1,10                                                    MH 00560
1200  PRDATA(1,J,K,L)= PRDATA(1,1,K,L)                                  MH 00570
      DO 1250 K=2,20                                                    MH 00580
      DO 1250 L=1,10                                                    MH 00590
1250  PRDATA(1,6,K,L)=PRDATA(1,5,K,L)                                   MH 00600
      DO 1260 I=2,7                                                     MH 00610
      DO 1260 J=1,2                                                     MH 00620
1260  PRDATA(1,I,16,J)= PRDATA(1,1,16,J)                                MH 00630
C                                                                       MH 00640
C     READ IN ARTILLERY PARAMETERS                                      MH 00650
```

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C                                                                       MH 00660
      READ(5,100) ((PRDATA(2,1,I,J),J=1,4),I=4,15)                      MH 00670
      READ(5,100) ((PRDATA(2,4,I,J),J=1,4),I=2,13)                      MH 00680
      READ(5,100) ((PRDATA(2,5,I,J),J=1,4),I=2,5)                       MH 00690
      DO 1300 I=2,3                                                     MH 00700
      DO 1300 J=4,15                                                    MH 00710
      DO 1300 K=1,10                                                    MH 00720
1300  PRDATA(2,I,J,K)= PRDATA(2,1,J,K)                                  MH 00730
      READ(5,101) ((PRDATA(3,2,I,J),J=1,8),I=2,14)                      MH 00740
C                                                                       MH 00750
C     READ IN THE BALLISTIC PARAMETERS                                  MH 00760
C                                                                       MH 00770
      READ(5,102) NCHGS,NRINC                                           MH 00780
      READ(5,100) RMAX                                                  MH 00790
      DO 1400 I=1,NCHGS                                                 MH 00800
      DO 1400 J=1,3                                                     MH 00810
1400  READ(5,101) (FD105(I,K,J),K=1,NRINC)                              MH 00820
      READ(5,102) NU,NGUNS                                              MH 00830
C                                                                       MH 00840
C     READ THE TARGET DESCRIPTION PARAMETERS                            MH 00850
C                                                                       MH 00860
      READ(5,100) PRDATA(3,1,11,1)                                      MH 00870
      READ(5,100) ((PRDATA(3,1,I,J),J=1,4),I=1,10)                      MH 00880
C     READ IN MISCELLANEOUS PARAMETERS                                  MH 00890
      READ(5,103) EXMN,XLETH                                            MH 00900
      RETURN                                                            MH 00910
100   FORMAT(4F10.2)                                                    MH 00920
101   FORMAT(8F10.2)                                                    MH 00930
102   FORMAT(2I10)                                                      MH 00940
103   FORMAT(F10.3)                                                     MH 00950
      END                                                               MH 00960

      SUBROUTINE EARRAY(IOPEN)                                          MH 00970
C                                                                       MH 00980
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MH 00990
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MH 01000
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MH 01010
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MH 01020
     2XTLETH ,STAT(20,4)                                                MH 01030
C                                                                       MH 01040
      DO 100 I=6,250                                                    MH 01050
      IF (EVLIST(I,50) .EQ. 0) GO TO 200                                MH 01060
100   CONTINUE                                                          MH 01070
      CALL TERM(1,1)                                                    MH 01080
      CALL EXIT                                                         MH 01090
200   IOPEN=I                                                           MH 01100
      EVLIST(I,50)= 1.0                                                 MH 01110
```

```
      RETURN                                                             MH 01120
      END                                                                MH 01130

      SUBROUTINE HARRAY(IR)                                              MH 01140
C                                                                        MH 01150
C     THIS SUBROUTINE LOCATES AN EMPTY STORAGE LOCATION IN THE TARGET    MH 01160
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,          MH 01170
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),   MH 01180
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                    MH 01190
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,    MH 01200
     2XTLETH ,STAT(20,4)                                                 MH 01210
C                                                                        MH 01220
      DO 100 I=1,250                                                     MH 01230
      IF (TGT(I,40) .EQ. 0) GO TO 200                                    MH 01240
100   CONTINUE                                                           MH 01250
      CALL TERM(2,1)                                                     MH 01260
      CALL EXIT                                                          MH 01270
200   IR=I                                                               MH 01280
      TGT(I,40)= 1.0                                                     MH 01290
      TGT(I,39)= 1.0                                                     MH 01300
      RETURN                                                             MH 01310
      END                                                                MH 01320

      SUBROUTINE DARRAY(IS)                                              MH 01330
C                                                                        MH 01340
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,          MH 01350
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),   MH 01360
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                    MH 01370
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,    MH 01380
     2XTLETH ,STAT(20,4)                                                 MH 01390
C                                                                        MH 01400
      DO 100 I=1,10                                                      MH 01410
      IF (TDES(I,300,1) .EQ. 0) GO TO 200                                MH 01420
100   CONTINUE                                                           MH 01430
      CALL TERM(3,1)                                                     MH 01440
      CALL EXIT                                                          MH 01450
200   IS=I                                                               MH 01460
      TDES(I,300,1)= 1.0                                                 MH 01470
      RETURN                                                             MH 01480
      END                                                                MH 01490
```

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      SUBROUTINE IPROUT                                                 MI 00010
C                                                                       MI 00020
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MI 00030
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MI 00040
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MI 00050
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MI 00060
     2XTLETH ,STAT(20,4)                                                MI 00070
C                                                                       MI 00080
C     PRINT PART I                                                      MI 00090
C                                                                       MI 00100
C     PRINT SECTION I                                                   MI 00110
C                                                                       MI 00120
      WRITE(6,100)                                                      MI 00130
      WRITE(6,101)                                                      MI 00140
      WRITE(6,102) ((PRDATA(1,7,J,K),K=1,4),J=2,5),((PRDATA(1,7,K,J),   MI 00150
     2J=1,2),K=16,17)                                                   MI 00160
      WRITE(6,103)                                                      MI 00170
      WRITE(6,102) ((PRDATA(1,5,J,K),K=1,4),J=2,5),((PRDATA(1,5,K,J),J=MI 00180
     21,2),K=16,17)                                                     MI 00190
      WRITE(6,104)                                                      MI 00200
      WRITE(6,102) ((PRDATA(1,1,J,K),K=1,4),J=2,5),((PRDATA(1,1,K,J),   MI 00210
     2J=1,2),K=16,17)                                                   MI 00220
      WRITE(6,110)                                                      MI 00230
C                                                                       MI 00240
C     PRINT SECTION II                                                  MI 00250
C                                                                       MI 00260
      WRITE(6,100)                                                      MI 00270
      WRITE(6,105)                                                      MI 00280
      WRITE(6,106)                                                      MI 00290
      WRITE(6,107) (PRDATA(1,7,18,J),J=1,8),(PRDATA(1,7,6,J),J=1,8),    MI 00300
     2((PRDATA(1,7,K,J),J=1,3),K=8,14,2)                                MI 00310
      WRITE(6,108)                                                      MI 00320
      WRITE(6,107) (PRDATA(1,7,19,J),J=1,8),(PRDATA(1,7,7,J),J=1,8),    MI 00330
     2((PRDATA(1,7,K,J),J=1,3),K=9,15,2)                                MI 00340
      WRITE(6,100)                                                      MI 00350
      WRITE(6,103)                                                      MI 00360
      WRITE(6,106)                                                      MI 00370
      WRITE(6,107) (PRDATA(1,5,18,J),J=1,8),(PRDATA(1,5,6,J),J=1,8),    MI 00380
     2((PRDATA(1,5,K,J),J=1,3),K=8,14,2)                                MI 00390
      WRITE(6,108)                                                      MI 00400
      WRITE(6,107) (PRDATA(1,5,19,J),J=1,8),(PRDATA(1,5,7,J),J=1,8),    MI 00410
     2((PRDATA(1,5,K,J),J=1,3),K=9,15,2)                                MI 00420
      WRITE(6,100)                                                      MI 00430
      WRITE(6,104)                                                      MI 00440
      WRITE(6,106)                                                      MI 00450
      WRITE(6,107) (PRDATA(1,1,18,J),J=1,8),(PRDATA(1,1,6,J),J=1,8),    MI 00460
```

```
     2((PRDATA(1,1,K,J),J=1,3),K=8,14,2)
      WRITE(6,108)
      WRITE(6,107) (PRDATA(1,1,19,J),J=1,8),(PRDATA(1,1,7,J),J=1,8),
     2((PRDATA(1,1,K,J),J=1,3),K=9,15,2)
      WRITE(6,100)
C
C     PRINT SECTION III
C
      WRITE(6,111) ((PRDATA(2,1,J,K),K=1,2),J=4,5),((PRDATA(2,1,J,K),K=
     21,4),J=6,8),(PRDATA(2,1,9,K),K=1,2)
      DO 36 J=1,6
      L=J+9
36    WRITE(6,1110) J,(PRDATA(2,1,L,K),K=1,4)
      WRITE(6,1111)
      WRITE(6,100)
C
C     PRINT SECTION IV
C
      WRITE(6,112) ((PRDATA(2,4,J,K),K=1,4),J=2,7)
      WRITE(6,1120) ((PRDATA(2,4,J,K),K=1,4),J=8,9)
      WRITE(6,1121) ((PRDATA(2,4,J,K),K=1,4),J=10,13),((PRDATA(2,5,J,K)
     2,K=1,2),J=2,5)
      WRITE(6,100)
C
C     PRINT SECTION V
C
      WRITE(6,113)
      WRITE(6,114)
      WRITE(6,192) (PRDATA(3,1,10,J),J=1,2),((PRDATA(3,1,J,K),K=1,2),
     2J=2,4),(PRDATA(3,1,1,K),K=1,2)
      WRITE(6,116)
      WRITE(6,192) (PRDATA(3,1,9,J),J=1,2),((PRDATA(3,1,J,K),K=1,2),
     2J=6,8),(PRDATA(3,1,5,K),K=1,2)
      WRITE(6,100)
C
C     PRINT SECTION VI
C
      WRITE(6,117)
      SUM=0.0
      DO 1200 I=1,8
      SUM=SUM+PRDATA(3,2,9,I)
      WRITE(6,118) I,(PRDATA(3,2,I,J),J=1,2)
      IF(SUM .EQ. 1) GO TO 1201
1200  CONTINUE
1201  CONTINUE
      WRITE(6,119) (PRDATA(3,2,11,J),J=1,8),(PRDATA(3,2,10,J),J=1,8)
      WRITE(6,120) (PRDATA(3,2,13,J),J=1,8),(PRDATA(3,2,12,J),J=1,8)
      WRITE(6,121)
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      WRITE(6,122) (PRDATA(3,2,9,J),J=1,8)                             MI 00950
      WRITE(6,123)                                                      MI 00960
      WRITE(6,122) (PRDATA(3,2,14,J),J=1,8)                            MI 00970
      WRITE(6,124)                                                      MI 00980
      WRITE(6,100)                                                      MI 00990
C                                                                       MI 01000
C     PRINT SECTION VII                                                 MI 01010
C                                                                       MI 01020
      WRITE(6,125)                                                      MI 01030
      DO 1210 I=1,NCHGS                                                 MI 01040
      WRITE(6,126) I                                                    MI 01050
      WRITE(6,127)                                                      MI 01060
      DO 1209 J=1,NRINC                                                 MI 01070
      ISK=500*J                                                         MI 01080
1209  WRITE(6,128) ISK,(FD105(I,J,K),K=1,3)                             MI 01090
      WRITE(6,1281)                                                     MI 01100
      WRITE(6,100)                                                      MI 01110
1210  CONTINUE                                                          MI 01120
C                                                                       MI 01130
C     PRINT SECTION VIII                                                MI 01140
C                                                                       MI 01150
      WRITE(6,129)                                                      MI 01160
      DO 1300 I=2,40,2                                                  MI 01170
      XKL=I*1.                                                          MI 01180
      XKI=EXP(-((I*1.)**2/XLETH**2))                                    MI 01190
1300  WRITE(6,130) XKL,XKI                                              MI 01200
      DO 1301 I=50,300,10                                               MI 01210
      XKL=I*1.                                                          MI 01220
      XKI=EXP(-((I*1.)**2/XLETH**2))                                    MI 01230
1301  WRITE(6,130) XKL,XKI                                              MI 01240
      WRITE(6,131) XLETH                                                MI 01250
      WRITE(6,100)                                                      MI 01260
C                                                                       MI 01270
C     PRINT PART II                                                     MI 01280
C                                                                       MI 01290
C     PRINT SECTION I                                                   MI 01300
C                                                                       MI 01310
      WRITE(6,132)                                                      MI 01320
      IN=7                                                              MI 01330
      IM=7                                                              MI 01340
1399  CONTINUE                                                          MI 01350
      DO 1400 I=IN,IM                                                   MI 01360
      IF(I .LE. 4) WRITE(6,135) I                                       MI 01370
      IF(I .EQ. 5 .OR. I .EQ. 6) WRITE(6,134) I                         MI 01380
      IF( I .EQ. 7) WRITE(6,133)                                        MI 01390
      WRITE(6,136) (GDATA(I,J),J=3,5,2),(GDATA(I,J),J=7,10),(GDATA(I,J)MI 01400
     2,J=12,13)                                                         MI 01410
      WRITE(6,100)                                                      MI 01420
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1400   CONTINUE                                                             MI 01430
       IF(IN .NE. 7) GO TO 1401                                             MI 01440
       IN=5                                                                 MI 01450
       IM=6                                                                 MI 01460
       GO TO 1399                                                           MI 01470
1401   IF(IN .NE. 5) GO TO 1402                                             MI 01480
       IN=1                                                                 MI 01490
       IM=4                                                                 MI 01500
       GO TO 1399                                                           MI 01510
1402   CONTINUE                                                             MI 01520
C                                                                           MI 01530
C      PRINT SECTION II                                                     MI 01540
C                                                                           MI 01550
       WRITE(6,137)                                                         MI 01560
       DO 1500 I=1,3                                                        MI 01570
       WRITE(6,138) I                                                       MI 01580
       IF(ARDATA(I,7,6) .LT. 0) ARDATA(I,7,6)= 6.28-ABS(ARDATA(I,7,6))      MI 01590
       SBAT= 6400.*ARDATA(I,7,6)/(2*3.14)                                   MI 01600
       WRITE(6,139) (ARDATA(I,7,J),J=3,4),(ARDATA(I,7,J),J=7,10),           MI 01610
     2SBAT,(J,(ARDATA(I,J,K),K=3,4),J=1,6)                                  MI 01620
       WRITE(6,100)                                                         MI 01630
1500   CONTINUE                                                             MI 01640
C                                                                           MI 01650
C      PRINT PART III                                                       MI 01660
C                                                                           MI 01670
       WRITE(6,140)                                                         MI 01680
       K=0                                                                  MI 01690
       DO 1600 I=1,ITGT                                                     MI 01700
       IF( TGT(I,7) .EQ. 1 .AND. TGT(I,11) .EQ. 0) GO TO 1600               MI 01710
       WRITE(6,141) K,(TGT(I,J),J=1,2)                                      MI 01720
       K=K+1                                                                MI 01730
       IF(TGT(I,5) .EQ. 1) WRITE(6,142)                                     MI 01740
       IF(TGT(I,6) .EQ. 1) WRITE(6,143)                                     MI 01750
       IF(TGT(I,7) .EQ. 1) WRITE(6,144)                                     MI 01760
       WRITE(6,145) (TGT(I,J),J=3,4),TGT(I,11)                              MI 01770
       IF(TGT(I,6) .EQ. 1) GO TO 1600                                       MI 01780
       WRITE(6,146) TGT(I,8)                                                MI 01790
1600   CONTINUE                                                             MI 01800
       WRITE(6,100)                                                         MI 01810
       RETURN                                                               MI 01820
100    FORMAT(1H1)                                                          MI 01830
101    FORMAT(T63,'PART I'//T61,'SECTION I'//T49,'BASIC MANEUVER ELEMENTMI 01840
     2 PARAMETERS'////T7,'DESCRIPTION',T35,'TYPE OF DISTRIBUTION',T70,      MI 01850
     3'MEAN',T85,'VARIANCE',T100,'LOWER',T115,'UPPER'/T100,'LIMIT',         MI 01860
     4T115, 'LIMIT'///T60,'BRIGADE DATA'////)                               MI 01870
102    FORMAT(1X,'WIDTH OF FRONT',T37,'TRUNCATED NORMAL',T65,F10.2,         MI 01880
     2T84,F10.2,T98,F10.2,T113,F10.2//1X,'DISTANCE TO OBJECTIVE',T37,       MI 01890
     3'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,T98,F10.2,T113,F10.2//         MI 01900
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     51X,'LENGTH OF OBJ MAJ AXIS',T37,'TRUNCATED NORMAL',T65,F10.2,     MI 01910
     6T84,F10.2,T98,F10.2,T113,F10.2//1X,'LENGTH OF OBJ MIN AXIS',      MI 01920
     7T37 ,'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,T98,F10.2,T113,F10.2//MI 01930
     8  1X,'MOVEMENT RATE (KM/HR)',T37,'UNIFORM',T98,F10.2,T113,        MI 01940
     2F10.2//1X,'LATERAL DISPLACEMENT OF UNIT',T37,'TRUNCATED NORMAL',  MI 01950
     2T65,F10.2,T84,F10.2,T98,'SEE NOTE'/1X,'OBJECTIVE ABOUT UNIT'/1X,'CMI 01960
     2ENTER LINE'/)                                                     MI 01970
103    FORMAT(T59,'BATTALION DATA'///)                                  MI 01980
104    FORMAT(T60,'COMPANY DATA'///)                                    MI 01990
105    FORMAT(T61,'SECTION II'//T54,'FIREPLANNING PARAMETERS'///        MI 02000
     2T60,'BRIGADE DATA'///)                                            MI 02010
106    FORMAT(T56,'FIREPLANNING STATE 1'/T56,'--------------------'//)  MI 02020
107    FORMAT(1X,'VALUES FOR NUMBER OF TARGETS UNIT WILL',T80,8F6.2/1X, MI 02030
     2'PLAN IN THE FIREPLANNING PROCESS'//1X,'PROBABILITIES ASSOCIATED WMI 02040
     3ITH THE ABOVE VALUES',T80,8F6.2//1X,'PROBABILITY THAT A RANDOM TARMI 02050
     4GET IS A',T80,3F6.2/1X,'PREPARATORY TARGET, SCHEDULED TARGET'/1X, MI 02060
     3'OR AN ON CALL TARGET'//1X,'PROBABILITY THAT A RANDOM PREPARATORY MI 02070
     4TARGET',T80,3F6.2/1X,'IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN THMI 02080
     5E'/1X,'LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE'/1X,'OR BMI 02090
     7EYOND THE UNIT OBJECTIVE'//1X,'PROBABILITY THAT A RANDOM SCHEDULEDMI 02100
     8', T80,3F6.2/1X,'TARGET IS LOCATED ON THE UNIT OBJECTIVE, BETWEEN MI 02110
     9THE'/1X,'LINE OF DEPARTURE(OR FEBA) AND THE UNIT OBJECTIVE'//     MI 02120
     31X,'PROBABILITY THAT A RANDOM ON CALL TARGET',T80,3F6.2/1X,       MI 02130
     3'IS LOCATED ON THE UNIT OBJECTIVE,BETWEEN THE'/1X,'LINE OF DEPARTUMI 02140
     4RE(OR FEBA) AND THE UNIT OBJECTIVE'/1X,'OR BEYOND THE UNIT OBJECTIMI 02150
     5VE'/////)                                                         MI 02160
108    FORMAT(T56,'FIREPLANNING STATE 2'/T56,'--------------------'//)  MI 02170
110    FORMAT(///10X,'NOTES'//10X,'(1) ALL DISTANCE MEASUREMENTS ARE IN MI 02180
     2METERS'/10X,'(2) BOUNDS ON THE LATERAL DISPLACEMENT OF THE UNIT OBMI 02190
     3JECTIVES'/14X,'ARE FUNCTIONS OF THE RESPECTIVE UNIT LEFT AND RIGHTMI 02200
     4 BOUNDARIES')                                                     MI 02210
111    FORMAT(T60,'SECTION III'//T53,'ARTILLERY UNIT PARAMETERS'//////  MI 02220
     2T7,'DESCRIPTION',T35,'TYPE OF DISTRIBUTION',T70,'MEAN',T85,       MI 02230
     3'VARIANCE',T100,'LOWER',T115,'UPPER'/T100,'LIMIT',T115,'LIMIT'//  MI 02240
     41X,'BATTERY LATERAL DISPLACEMENT',T37,'TRUNCATED NORMAL',T65,     MI 02250
     5F10.2,T84,F10.2,T98,'SEE NOTES'/1X,'ABOUT THE CENTER LINE'/1X,    MI 02260
     6'OF THE SUPPORTED UNIT'//1X,'BATTERY DEPTH DISPLACEMENT',T37,     MI 02270
     6'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,T98,'SEE NOTES'/           MI 02280
     61X,                                                               MI 02290
     6'BEHIND THE FRONT LINE'/1X,'OF THE SUPPORTED UNIT'//1X,'MARCH ORDEMI 02300
     7R TIME (SEC)',T37,'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,         MI 02310
     8T98,F10.2,T113,F10.2//1X,'MOVEMENT RATE(KM/HR)',T37,              MI 02320
     9'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,T98,F10.2,T113,F10.2//     MI 02330
     21X,'UNIT EMPLACEMENT TIME (SEC)',T37,'TRUNCATED NORMAL',T65,F10.2,MI 02340
     3T84,F10.2,T98,F10.2,T113,F10.2//1X,'POSITION ERROR COMPONENT',T37,MI 02350
     4'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,T98,'SEE NOTE'////         MI 02360
     4T55,'DISPERSION OF WEAPONS'//,T55,'UNIFORM DISTRIBUTIONS'//       MI 02370
     4T10,'WEAPON',T50,'DEPTH DISPERSION',T100,'LATERAL DISPERSION'//T40MI 02380
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     4,'LOWER LIMIT',T65,                                               MI 02390
     7'UPPER LIMIT',T90,'LOWER LIMIT',T118,'UPPER LIMIT'/)              MI 02400
1110  FORMAT(T12,I2,T42,F6.1,T67,F6.1,T92,F6.1,T120,F6.1)               MI 02410
1111  FORMAT(                     ///10X,'NOTES'//10X,'(1) BOUNDS ON LAMI 02420
     8TERAL DISPLACEMENTS ARE THE LATERAL BOUNDARIES OF THE SUPPORTED UNMI 02430
     9IT'//10X,'(2) BOUNDS ON THE DEPTH DISPLACEMENT ARE THE FRONT LINE MI 02440
     2 AND A POINT MAX RANGE BEHIND THE FRONT LINE'//10X,'(3) LATERAL BOMI 02450
     3UNDS ON THE ERROR COMPONENT ARE FUNCTIONS OF THE BOUNDS IN (1) ANDMI 02460
     4 (2) ABOVE'//10X,'(4) DISTANCE MEASURES ARE IN METERS'//          MI 02470
     610X,'(5) TIME MEASURES ARE IN SECONDS'/)                          MI 02480
112   FORMAT(T61,'SECTION IV'//T49,'FIRE MISSION PROCESSING PARAMETERS'MI 02490
     2///  T7,'DESCRIPTION',T35,'TYPE OF DISTRIBUTION',T70,'MEAN',T85,  MI 02500
     3'VARIANCE',T102,'LOWER',T117,'UPPER'/T102,'LIMIT',T117,'LIMIT'/// MI 02510
     51X,'TIME FOR THE FO TO PREPARE',T37,'TRUNCATED NORMAL',T65,F10.2,TMI 02520
     684,F10.2,T98,F10.2,T113,F10.2/1X,'THE FIRE MISSION FOR A'/1X, 'TARMI 02530
     6GET OF OPPORTUNITY'//1X,'TIME FOR THE FO TO TRANSMIT',T37,'TRUNCATMI 02540
     7ED NORMAL',T65,F10.2,T84,F10.2,T98,F10.2,T113,F10.2/2X,'THE REQUESMI 02550
     8T FOR FIRE TO'/1X,'THE FDC'//1X,'TIME REQUIRED TO CONDUCT THE',T37MI 02560
     6,'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,T98,F10.2,T113,F10.2/1X,  MI 02570
     6'ANALYSIS OF THE TARGET'//1X,'TIME REQUIRED FOR THE ADJUSTING',T37MI 02580
     6,'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,T98,F10.2,T113,F10.2/1X,  MI 02590
     6'UNIT TO PREPARE AND FIRE'/1X,'A VOLLEY IN THE ADJUSTMENT'//1X,   MI 02600
     6'TIME FOR THE FO TO MAKE',T37,'TRUNCATED NORMAL',T65,F10.2,T84,F10MI 02610
     6.2,T98,F10.2,T113,                                                MI 02620
     5F10.2/1X,'ADJUSTMENT CORRECTIONS AND'/1X,'TRANSMIT THEM TO FDC'//1MI 02630
     7X,'TIME FOR FDC TO COMPUTE',T37,'TRUNCATED NORMAL',T65,F10.2,T84, MI 02640
     6F10.2,T98,F10.2,T113,F10.2/1X,'NEW ADJUSTING FIRING DATA AND')    MI 02650
1120  FORMAT(1X,'TRANSMIT IT TO THE ADJUSTING UNIT'//1X,'TIME FOR FDC TMI 02660
     20 SELECT A',T37,'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,T98,F10.2, MI 02670
     3T113,F10.2/1X,'MASS POINT IN THE FIRE FOR'/1X,'EFFECT PHASE,COMPUTMI 02680
     4E THE DATA,'/1X,'AND TRANSMIT IT TO THE FIRING'/1X,'UNITS'//      MI 02690
     51X,'TIME REQUIRED FOR A FIRING',T37,'TRUNCATED NORMAL',T65,F10.2,TMI 02700
     584,F10.2,T98,F10.2,T113,F10.2/                                    MI 02710
     61X,'UNIT TO PREPARE AND FIRE A'/1X,'VOLLEY IN FIRE FOR EFFECT WHENMI 02720
     5'/1X,'THE DATA IS DIFFERENT FROM'/1X,'THAT USED IN THE PREVIOUS') MI 02730
1121  FORMAT(1X,'VOLLEY'//1X,'TIME REQUIRED FOR A FIRING',T37,'TRUNCATEMI 02740
     2D NORMAL',T65,F10.2,T84,F10.2,T98,F10.2,T113,F10.2/1X,'UNIT TO PREMI 02750
     3PARE AND FIRE A'/1X,'VOLLEY IN FIRE FOR'/1X,'EFFECT WHEN THE FIRINMI 02760
     3G DATA'                                                           MI 02770
     7/1X,'IS UNCHANGED'//1X,'TIME FOR THE REINFORCING UNIT',T37,'TRUNCAMI 02780
     7TED NORMAL',T65,F10.2,T84,F10.2,T98,F10.2,T113,F10.2/1X,'TO SHOOT MI 02790
     7A TARGET OF OPPORTUNITY'/1X,'MISSION'//1X,'TIME FOR THE REINFORCINMI 02800
     8G UNIT',T37,'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,T98,F10.2,     MI 02810
     9T113,F10.2/1X,'TO SHOOT A SCHEDULED MISSION'//1X,'TIME FOR REINFORMI 02820
     2CING UNIT',T37,'TRUNCATED NORMAL',T65,F10.2,T84,F10.2,T98,F10.2,  MI 02830
     4T113,F10.2/1X,'TO SHOOT A PREP MISSION'///  T55,'BASIC ERROR PARAMMI 02840
     3ETERS'//T28,'PARAMETERS FOR LINEAR FUNCTIONS REPRESENTING VARIANCEMI 02850
     2 AS A FUNCTION OF RANGE'//T7,'DESCRIPTION',T33,'INTERCEPT',       MI 02860
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     2T53,'SLOPE'//                                                    MI 02870
     61X,'EASTING COMPONENT OF TARGET',T32,F10.4,T48,F10.4/1X,'LOCATION MI 02880
     6ERROR'//1X,'NORTHING COMPONENT OF TARGET',T32,F10.4,T48,F10.4/1X, MI 02890
     3'LOCATION ERROR'//1X,'DEFLECTION COMPONENT OF',T32,F10.4,T48,F10.4MI 02900
     7/1X,'BURST LOCATION ERROR'//1X,'RANGE COMPONENT OF',T32,F10.4,    MI 02910
     5T48,F10.4/1X,'BURST LOCATION ERROR'/)                            MI 02920
113    FORMAT(T61,'SECTION V'//T50,'TARGET CHARACTERISTIC PARAMETERS'//)MI 02930
114    FORMAT(T57,'CATEGORY I TARGET'///)                              MI 02940
116    FORMAT(///T57,'CATEGORY II TARGET'///)                          MI 02950
117    FORMAT(T61,'SECTION VI'//T55,'ENGAGEMENT STRATEGIES'//T10,'STRATEMI 02960
     2GY NUMBER',T82,'LENGTH',T102,'DEPTH'//)                          MI 02970
118    FORMAT(T15,I1,T78,F10.2,T98,F10.2/)                             MI 02980
119    FORMAT(///T35,'DISTRIBUTION OF NUMBER OF VOLLEYS IN THE FIRE FOR MI 02990
     2EFFECT PHASE'/T52,'FOR A TARGET OF OPPORTUNITY'///T10,'NUMBER OF VMI 03000
     3OLLEYS',T30,8F10.0//T10,'PROBABILITY',T30,8F10.2///)             MI 03010
120    FORMAT(//T35,'DISTRIBUTION OF NUMBER OF VOLLEYS IN THE FIRE FOR EMI 03020
     2FFECT PHASE'/T55,'FOR A SCHEDULED TARGET'///T10,'NUMBER OF VOLLEYSMI 03030
     3',T30,8F10.0//T10,'PROBABILITY',T30,8F10.2///)                   MI 03040
121    FORMAT(T27,'PROBABILITY DISTRIBUTION ON THE ATTACK STRATEGIES FORMI 03050
     2 A TARGET OF OPPORTUNITY'//)                                     MI 03060
122    FORMAT(T10,'STRATEGY NUMBER',T30,'1',T40,'2',T50,'3',T60,'4',T70,MI 03070
     2'5',T80,'6',T90,'7',T100,'8'//T10,'PROBABILITY',  T29,F3.2,T39,F3.MI 03080
     32,T49,F3.2,T59,F3.2,T69,F3.2,T79,F3.2,T89,F3.2,T99,F3.2///)      MI 03090
123    FORMAT(T31,'PROBABILITY DISTRIBUTION ON THE ATTACK STRATEGIES FORMI 03100
     2 A SCHEDULED TARGET'//)                                          MI 03110
124    FORMAT(T10,'NOTES'//T10,'LENGTH AND WIDTH FOR THE ATTACK STRATEGIMI 03120
     2ES REFER TO THE DIMENSIONS OF THE BOX WHICH IS SUPERIMPOSED OVER TMI 03130
     4HE TARGET AREA')                                                 MI 03140
125    FORMAT(T60,'SECTION VII'//T54,'ARTILLERY BALLISTIC DATA'//)     MI 03150
126    FORMAT(T62,'CHARGE',1X,I1///)                                   MI 03160
127    FORMAT(T20,'RANGE',T50,'PER',T71,'PED',T91,'TOF'//)             MI 03170
128    FORMAT(T19,I6,T45,F8.2,T65,F10.2,T85,F10.2)                     MI 03180
129    FORMAT(T60,'SECTION VIII'//T57,'LETHALITY FUNCTION'/////T27,    MI 03190
     2'MISS DISTANCE',T85,'PROBABILITY OF BECOMING A CASUALTY'//)      MI 03200
130    FORMAT(T30,F8.0,T98,F8.7)                                       MI 03210
131    FORMAT(T10,'NOTE: VALUES ARE BASED ON LETHALITY PARAMETER OF',  MI 03220
     2F10.3)                                                           MI 03230
132    FORMAT(T62,'PART II'//T53,'INITIAL UNIT DISPOSITIONS'//T62,     MI 03240
     2'SECTION I'//T57,'MANEUVER ELEMENTS'//)                          MI 03250
133    FORMAT(T62,'BRIGADE'/////)                                      MI 03260
134    FORMAT(T60,'BATTALION',1X,I1/////)                              MI 03270
135    FORMAT(T61,'COMPANY',1X,I1/////)                                MI 03280
136    FORMAT(T58,'UNIT BOUNDARIES'///T32,'LEFT',T99,'RIGHT'///T26,    MI 03290
     2F10.3,1X,'EAST',T94,F10.3,1X,'NORTH'///T59,'OBJECTIVE DATA'///T28,MI 03300
     2'DESCRIPTION',T64,'EAST',T99,'NORTH'//T20,'OBJECTIVE CENTER',T60, MI 03310
     2F10.2,T97,F10.2//T20,'LENGTH OF MAJOR AXIS',T60,F10.2,2X,'METERS'/MI 03320
     2      /T20,'LENGTH OF MINOR AXIS',T60,F10.2,2X,'METERS'////T56,   MI 03330
     2'FIREPLANNING CENTER'//T40,'EAST',T85,'NORTH'///T36,F10.3,T83,    MI 03340
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     2F10.3///)                                                           MI 03350
137    FORMAT(T61,'SECTION II'//T61,'ARTILLERY'///)                       MI 03360
138    FORMAT(////T61,'BATTERY',1X,I1///////)                             MI 03370
139    FORMAT(T10,'ACTUAL BATTERY CENTER',T60,F10.2,2X,'EAST',T90,F10.2,MI 03380
     22X,'NORTH'//T10,'ASSIGNED BATTERY CENTER',T60,F10.2,2X,'EAST',      MI 03390
     2T90,F10.2,2X,'NORTH'//T10,'POSITION ERROR',T60,F10.2,2X,'EAST',     MI 03400
     2T90,F10.2,2X,'NORTH'//T10,'AZIMUTH OF LAY',T60,F10.2,2X,'MILS'////MI 03410
     2T58,'WEAPON LOCATIONS'//T31,'WEAPON',T64,'EAST',T99,'NORTH'//       MI 03420
     26(T32,I1,T60,F10.2,T96,F10.2/))                                     MI 03430
140    FORMAT(T62,'PART III'//T58,'INITIAL FIRE PLAN'////T12,'LINE',      MI 03440
     2T25,'TARGET',T40,'ORIG',T54,'TYPE',T79,'TARGET LOCATION',           MI 03450
     3T107,'UNIT SCHD',T120,'TIME SCHD'/T11,'NUMBER',T25,'NUMBER',T40,'UMI 03460
     4NIT',T53,'TARGET',T68,'EAST',T96 ,'NORTH'//)                        MI 03470
141    FORMAT(T14,I2,T27,F3.0,T40,F2.0)                                   MI 03480
142    FORMAT('+',T54,'SCHD')                                             MI 03490
143    FORMAT('+',T54,'ON CALL')                                          MI 03500
144    FORMAT('+',T54,'PREP')                                             MI 03510
145    FORMAT('+',T65,F10.2,T93,F10.3,T102,F10.2)                         MI 03520
146    FORMAT('+',T117,F10.2)                                             MI 03530
192    FORMAT(T10,'DESCRIPTION',T50,'DISTRIBUTION',T74,'LOWER LIMIT',     MI 03540
     2T94,'UPPER LIMIT'//T10,'NUMBER OF TGT ELEMENTS',T52,'UNIFORM',      MI 03550
     2T72,F10.0,T92,F10.0//T10,'DEPTH OF ZONE 1',T52,'UNIFORM',T72,F10.0MI 03560
     2,T92,F10.0//T10,'DEPTH OF ZONE 2',T52,'UNIFORM',T72,F10.0,T92,      MI 03570
     2F10.0//T10,'DEPTH OF ZONE 3',T52,'UNIFORM',T72,F10.0,T92,           MI 03580
     2F10.0//T10,'LATERAL WIDTH',T52,'UNIFORM',T72,F10.0,T92,F10.0//)     MI 03590
1281   FORMAT(////10X,'NOTE: A PER EQUAL TO 1000. INDICATES THE RANGE ISMI 03600
     2 NOT ACHIEVABLE WITH THIS CHARGE')                                  MI 03610
       END                                                                MI 03620
```

```
      SUBROUTINE RESET(I)
C
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,
     2XTLETH ,STAT(20,4)
C
      GO TO (100,200,300,400,500,600,700),I
100   J=1
      K=1
      GO TO 1000
200   K=2
      J=2
      GO TO 1000
300   K=3
      J=3
      GO TO 1000
400   K=4
      J=4
      GO TO 1000
500   K=1
      J=2
      GDATA(5,2)= 2.0
      GO TO 1000
600   K=3
      J=4
      GDATA(6,2)= 2.0
      GO TO 1000
700   K=1
      J=4
      GDATA(5,2)= 2.0
      GDATA(6,2)= 2.0
      GDATA(7,2)= 2.0
1000  DO 1100 N=K,J
      GDATA(N,15)= 0.0
      GDATA(N,14)= CTIME
1100  GDATA(N,2)= 2.0
      DO 1200 N=1,50
1200  EVLIST(IROW,N)= 0.0
      RETURN
      END
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      SUBROUTINE EXTGT                                                 MJ 00430
C                                                                      MJ 00440
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,        MJ 00450
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3), MJ 00460
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                  MJ 00470
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,  MJ 00480
     2XTLETH ,STAT(20,4)                                               MJ 00490
C                                                                      MJ 00500
      DO 100 I=1,250                                                   MJ 00510
      IF(TGT(I,9) .NE. 0) GO TO 100                                    MJ 00520
      IF(TGT(I,4) .NE. 0 .AND. TGT(I,4) .LT. GDATA(7,13)) CALL WD400(I)MJ 00530
100   CONTINUE                                                         MJ 00540
      EVLIST(3,1)= CTIME+1200
      RETURN                                                           MJ 00560
      END                                                              MJ 00570


      SUBROUTINE START                                                 MJ 00580
C                                                                      MJ 00590
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,        MJ 00600
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3), MJ 00610
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                  MJ 00620
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,  MJ 00630
     2XTLETH ,STAT(20,4)                                               MJ 00640
C                                                                      MJ 00650
C     EVENT SET UP FOR REOCCURRING EVENTS                              MJ 00660
C                                                                      MJ 00670
C     SET UP FIRST TARGET OF OPPORTUNITY                               MJ 00680
C                                                                      MJ 00690
      CALL EXPON(TOPT)                                                 MJ 00700
      TINC= TOPT                                                       MJ 00710
      CALL EARRAY(I)                                                   MJ 00720
      EVLIST(I,1)= TOPT                                                MJ 00730
      EVLIST(I,2)= 12.                                                 MJ 00740
C                                                                      MJ 00750
C     SET UP FIRST MAIN DECISON EVENT                                  MJ 00760
C                                                                      MJ 00770
      EVLIST(1,1)= 600.                                                MJ 00780
      EVLIST(1,2)= 7.                                                  MJ 00790
C                                                                      MJ 00800
C     SET UP DECISION EVENT (SPECIAL CYCLE)                            MJ 00810
C                                                                      MJ 00820
      EVLIST(4,1)= TOPT-1
      EVLIST(4,2)= 7.
C                                                                      MJ 00850
C     SET UP THE ARTILLERY MOVE DECISION                               MJ 00860
C                                                                      MJ 00870
      EVLIST(2,1)= 660.                                                MJ 00880
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      EVLIST(2,2)= 8.                                                   MJ 00890
C                                                                       MJ 00900
C     SET UP CLEAR UNFIRED TARGETS                                      MJ 00910
C                                                                       MJ 00920
      EVLIST(3,1)= 1800.
      EVLIST(3,2)= 13.
C                                                                       MJ 00950
C     SET FLAGS FOR START                                               MJ 00960
C                                                                       MJ 00970
      CALL EARRAY(I)                                                    MJ 00980
      EVLIST(I,1)= 0.0                                                  MJ 00990
      EVLIST(I,2)= 14.                                                  MJ 01000
      EVLIST(I,3)= 7.                                                   MJ 01010
C                                                                       MJ 01020
C     SET UP THE CONVERSION CYCLE FOR ON CALL TARGETS                   MJ 01030
C                                                                       MJ 01040
      CALL EARRAY(I)                                                    MJ 01050
      CALL EXPON(VT)                                                    MJ 01060
      EVLIST(I,1)= VT                                                   MJ 01070
      EVLIST(I,2)= 5.0                                                  MJ 01080
C                                                                       MJ 01090
C     SET UP THE QUEUE SAMPLING EVENT                                   MJ 01100
C                                                                       MJ 01110
      CALL EARRAY(I)                                                    MJ 01120
      EVLIST(I,1)= 10.                                                  MJ 01130
      EVLIST(I,2)= 6.0                                                  MJ 01140
      RETURN                                                            MJ 01150
      END                                                               MJ 01160


      SUBROUTINE DISGE                                                  MJ 01170
C                                                                       MJ 01180
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MJ 01190
     2EVLIST(250,50),ARDATA(4,7,16),IPOW,TDES(10,300,4),FD105(4,50,3),  MJ 01200
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MJ 01210
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MJ 01220
     2XTLETH ,STAT(20,4)                                                MJ 01230
C                                                                       MJ 01240
      NUNIT= CEVENT(3)                                                  MJ 01250
      IF(NUNIT .EQ. 100) GO TO 50                                       MJ 01260
      GDATA(NUNIT,16)= 0.0                                              MJ 01270
      GDATA(NUNIT,18)= 0.0                                              MJ 01280
      GDATA(NUNIT,14)= CTIME                                            MJ 01290
50    SUP(1)= 0.0                                                       MJ 01300
      DO 100 I= 1,50                                                    MJ 01310
100   EVLIST(IROW,I)= 0.0                                               MJ 01320
      RETURN                                                            MJ 01330
      END                                                               MJ 01340
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       SUBROUTINE WD100                                                 MJ 01350
C                                                                       MJ 01360
       COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,        MJ 01370
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MJ 01380
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MJ 01390
       COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,  MJ 01400
     2XTLETH ,STAT(20,4)                                                MJ 01410
C                                                                       MJ 01420
       IR= CEVENT(4)                                                    MJ 01430
       JR= CEVENT(5)                                                    MJ 01440
       NUNIT= TGT(IR,2)                                                 MJ 01450
       GDATA(NUNIT,16)= 0.0                                             MJ 01460
      TGT(IR,13)= CEVENT(35)                                            MJ 01470
       TGT(IR,12)= CTIME                                                MJ 01480
       IF (TGT(IR,11) .EQ. 100) GO TO 850                               MJ 01490
       TGT(IR,11) = 4.0                                                 MJ 01500
850    TGT(IR,14)= CEVENT(13)                                           MJ 01510
       DO 700 I=1,3                                                     MJ 01520
       IF(CEVENT(I+37) .EQ. 0) GO TO 700                                MJ 01530
       ARDATA(I,7,2)= 1.0                                               MJ 01540
       ARDATA(I,7,14)= 0.0                                              MJ 01550
700    CONTINUE                                                         MJ 01560
       IF(TGT(IR,26) .EQ. 0) TGT(IR,33)= 0.0                            MJ 01570
       IF(TGT(IR,26) .NE. 0) TGT(IR,33)= TGT(IR,14)/TGT(IR,26)          MJ 01580
       IF(TGT(IR,14) .EQ. 0) TGT(IR,34)= 0.0                            MJ 01590
       IF(TGT(IR,14) .NE. 0) TGT(IR,34)= TGT(IR,13)/TGT(IR,14)          MJ 01600
       TGT(IR,35)= CTIME-TGT(IR,10)                                     MJ 01610
       IF(TGT(IR,35) .EQ. 0) TGT(IR,36)= 0.0                            MJ 01620
       IF(TGT(IR,35) .NE. 0) TGT(IR,36)= TGT(IR,14)/TGT(IR,35)          MJ 01630
C                                                                       MJ 01640
C      GATHER CUMMULATIVE ROUNDS/KILL INFORMATION ON THE                MJ 01650
C      TARGETS OF OPPORTUNITY                                           MJ 01660
C                                                                       MJ 01670
       STAT(10,1)= STAT(10,1)+ TGT(IR,13)                               MJ 01680
       STAT(10,2)= STAT(10,2)+ TGT(IR,14)                               MJ 01690
       STAT(10,3)= STAT(10,3)+1                                         MJ 01700
C                                                                       MJ 01710
C      GATHER CUMMULATIVE KILL RATE INFORMATION                         MJ 01720
C                                                                       MJ 01730
       STAT(9,1)= STAT(9,1)+ TGT(IR,14)                                 MJ 01740
       STAT(9,2)= STAT(9,2)+ TGT(IR,35)                                 MJ 01750
       STAT(9,3)= STAT(9,3)+1                                           MJ 01760
       DO 600 I=1,50                                                    MJ 01770
600    EVLIST(IROW,I)= 0.0                                              MJ 01780
       WRITE(10,1275) (TGT(IR,IV),IV=1,40)                              MJ 01790
       DO 1700 I=1,40                                                   MJ 01800
```

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1700   TGT(IR,I)= 0.0                                                    MJ 01810
       DO 800 I= 1,300                                                   MJ 01820
       DO 800 J=1,2                                                      MJ 01830
800    TDES(JR,I,J)= 0.0                                                 MJ 01840
       RETURN                                                            MJ 01850
1275   FORMAT(40F10.2)                                                   MJ 01860
       END                                                               MJ 01870

       SUBROUTINE WD200                                                  MJ 01880
C                                                                        MJ 01890
       COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MJ 01900
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),    MJ 01910
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                    MJ 01920
       COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MJ 01930
     2XTLETH ,STAT(20,4)                                                 MJ 01940
C                                                                        MJ 01950
       IR= EVLIST(IROW,4)                                                MJ 01960
       JR= EVLIST(IROW,5)                                                MJ 01970
       TGT(IR,12)= CTIME                                                 MJ 01980
       DO 700 I=1,3                                                      MJ 01990
       IF(CEVENT(I+9) .EQ. 0) GO TO 700                                  MJ 02000
       ARDATA(I,7,2)= 1.0                                                MJ 02010
       ARDATA(I,7,14)= 0.0                                               MJ 02020
700    CONTINUE                                                          MJ 02030
       DO 600 I=1,50                                                     MJ 02040
600    EVLIST(IROW,I)= 0.0                                               MJ 02050
       WRITE(20,1275) (TGT(IR,IV),IV=1,40)                               MJ 02060
       DO 1700 I=1,40                                                    MJ 02070
1700   TGT(IR,I)= 0.0                                                    MJ 02080
       IF(JR .EQ. 0) RETURN                                              MJ 02090
       DO 800 I=1,300                                                    MJ 02100
       DO 800 J=1,2                                                      MJ 02110
800    TDES(JR,I,J)= 0.0                                                 MJ 02120
       RETURN                                                            MJ 02130
1275   FORMAT(40F10.2)                                                   MJ 02140
       END                                                               MJ 02150

       SUBROUTINE WD300                                                  MJ 02160
C                                                                        MJ 02170
       COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MJ 02180
     2EVLIST(250,50),ARDATA(4,7,16),IPOW,TDES(10,300,4),FD105(4,50,3),    MJ 02190
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                    MJ 02200
       COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MJ 02210
     2XTLETH ,STAT(20,4)                                                 MJ 02220
C                                                                        MJ 02230
       I= EVLIST(IROW,4)                                                 MJ 02240
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      J= EVLIST(IROW,5)                                                  MJ 02250
      TGT(I,11)= 100.                                                    MJ 02260
      TGT(I,12)= EVLIST(IROW,14)                                         MJ 02270
      TGT(I,10)= EVLIST(IROW,19)                                         MJ 02280
      DO 100 M=1,50                                                      MJ 02290
100   EVLIST(IROW,M)=0.0                                                 MJ 02300
      IF(J .EQ. 100) GO TO 250                                           MJ 02310
      DO 200 K=1,300                                                     MJ 02320
      DO 200 L=1,2                                                       MJ 02330
200   TDES(J,K,L)= 0.0                                                   MJ 02340
250   WRITE(30,1275) (TGT(I,J),J=1,40)                                   MJ 02350
      DO 300 J=1,40                                                      MJ 02360
300   TGT(I,J)= 0.0                                                      MJ 02370
      RETURN                                                             MJ 02380
1275  FORMAT(40F10.2)                                                    MJ 02390
      END                                                                MJ 02400


      SUBROUTINE WD400(I)                                                MJ 02410
C                                                                        MJ 02420
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,          MJ 02430
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),   MJ 02440
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                    MJ 02450
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,    MJ 02460
     2XTLETH ,STAT(20,4)                                                 MJ 02470
C                                                                        MJ 02480
      IS= TGT(I,20)                                                      MJ 02490
      WRITE(40,1275) (TGT(I,IV),IV=1,40)                                 MJ 02500
C                                                                        MJ 02510
C     ZERO THE ARRAY ROW IN THE TARGET HISTROY ARRAY                     MJ 02520
C                                                                        MJ 02530
      DO 100 J=1,40                                                      MJ 02540
      TGT(I,J)= 0.0                                                      MJ 02550
100   CONTINUE                                                           MJ 02560
C                                                                        MJ 02570
C     ZERO THE EVLIST ENTRIES                                            MJ 02580
C                                                                        MJ 02590
      IF(IS .EQ. 0) RETURN                                               MJ 02600
      DO 150 J=1,50                                                      MJ 02610
150   EVLIST(IS,J)= 0.0                                                  MJ 02620
      RETURN                                                             MJ 02630
1275  FORMAT(40F10.2)                                                    MJ 02640
      END                                                                MJ 02650
```

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      SUBROUTINE SET(QHOUR,R1,R2)                                       MJ 02660
C                                                                       MJ 02670
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MJ 02680
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MJ 02690
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MJ 02700
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MJ 02710
     2XTLETH ,STAT(20,4)                                                MJ 02720
C                                                                       MJ 02730
      CALL EARRAY(IX)                                                   MJ 02740
      EVLIST(IX,1)= QHOUR-900                                           MJ 02750
      EVLIST(IX,2)= 10.                                                 MJ 02760
      EVLIST(IX,3)= R1                                                  MJ 02770
      EVLIST(IX,4)= QHOUR                                               MJ 02780
      CALL EARRAY(IY)                                                   MJ 02790
      EVLIST(IY,1)= QHOUR                                               MJ 02800
      EVLIST(IY,2)= 14.                                                 MJ 02810
      EVLIST(IY,3)= R2                                                  MJ 02820
      RETURN                                                            MJ 02830
      END                                                               MJ 02840


      SUBROUTINE SUMRY                                                  MK 00010
C                                                                       MK 00020
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MK 00030
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MK 00040
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MK 00050
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MK 00060
     2XTLETH ,STAT(20,4)                                                MK 00070
      DIMENSION ROW(40),LINE(40),EVTR(50)                               MK 00080
C                                                                       MK 00090
      REWIND 10                                                         MK 00100
      REWIND 20                                                         MK 00110
      REWIND 25                                                         MK 00120
      REWIND 30                                                         MK 00130
      REWIND 40                                                         MK 00140
      IF(SUP(3) .EQ. 0) WRITE(6,10)                                     MK 00150
C                                                                       MK 00160
C     PRINT SECTION I                                                   MK 00170
C                                                                       MK 00180
      WRITE(6,100)                                                      MK 00190
      DO 110 I=1,1000                                                   MK 00200
      READ(25,1600,END=1000) (EVTR(J),J=1,50)                           MK 00210
      WRITE(6,1613) (EVTR(J),J=1,50)                                    MK 00220
      DO 110 K=12,1000,12                                               MK 00230
      IF(I .EQ. K) WRITE(6,69)                                          MK 00240
110   CONTINUE                                                          MK 00250
C                                                                       MK 00260
C     PRINT SECTION II                                                  MK 00270
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C                                                                         MK 00280
1000  WRITE(6,200)                                                        MK 00290
      DO 220 I=1,1000                                                     MK 00300
      DO 205 LT=1,1000,2                                                  MK 00310
      IF(I .EQ. LT) WRITE(6,95)                                           MK 00320
205   CONTINUE                                                            MK 00330
      READ(10,201,END=1100) (EVTR(J),J=1,40)                              MK 00340
      WRITE(6,500) EVTR(1),(EVTR(K),K=3,4),(EVTR(K),K=21,27),EVTR(10),    MK 00350
     2EVTR(2),(EVTR(K),K=28,32),(EVTR(K),K=13,14),(EVTR(K),K=33,36)       MK 00360
      DO 220 L=2,1000,2                                                   MK 00370
      IF(I .EQ. L) WRITE(6,69)                                            MK 00380
220   CONTINUE                                                            MK 00390
C                                                                         MK 00400
C     PRINT SECTION III                                                   MK 00410
C                                                                         MK 00420
1100  WRITE(6,305)                                                        MK 00430
      DO 300 I=1,1000                                                     MK 00440
      DO 296 L=1,1000,4                                                   MK 00450
      IF(I .EQ. L) WRITE(6,96)                                            MK 00460
296   CONTINUE                                                            MK 00470
      READ(20,201,END=1200) (EVTR(J),J=1,40)                              MK 00480
      WRITE(6,600) EVTR(1),EVTR(5),EVTR(7),EVTR(2),EVTR(8),EVTR(37),      MK 00490
     2EVTR(11),(EVTR(K),K=31,32),EVTR(13),EVTR(26),EVTR(14)               MK 00500
      DO 300 K=4,1000,4                                                   MK 00510
      IF(I .EQ. K) WRITE(6,69)                                            MK 00520
300   CONTINUE                                                            MK 00530
C                                                                         MK 00540
C     PRINT SECTION IV                                                    MK 00550
C                                                                         MK 00560
1200  WRITE(6,401)                                                        MK 00570
      DO 400 I=1,1000                                                     MK 00580
      DO 360 L=1,1000,5                                                   MK 00590
      IF(I .EQ. L) WRITE(6,96)                                            MK 00600
360   CONTINUE                                                            MK 00610
      READ(30,201,END=1300) (EVTR(J),J=1,40)                              MK 00620
      WRITE(6,700) EVTR(1),EVTR(5),EVTR(7),EVTR(9),EVTR(11),EVTR(10)      MK 00630
     2,EVTR(37),EVTR(35)                                                  MK 00640
      DO 400 L=5,1000,5                                                   MK 00650
      IF(I .EQ. L) WRITE(6,69)                                            MK 00660
400   CONTINUE                                                            MK 00670
C                                                                         MK 00680
C     PRINT SECTION V                                                     MK 00690
C                                                                         MK 00700
1300  WRITE(6,800)                                                        MK 00710
      DO 820 I=1,10                                                       MK 00720
      EVTR(I)=0.0                                                         MK 00730
      IF(STAT(I,2) .EQ. 0) GO TO 820                                      MK 00740
      EVTR(I)= STAT(I,1)/STAT(I,2)                                        MK 00750
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820   CONTINUE                                                          MK 00760
      WRITE(6,801) (EVTR(K),K=1,10)                                     MK 00770
      RETURN                                                            MK 00780
10    FORMAT(2X,'FINAL OBJECTIVE WAS SECURED'//)                        MK 00790
69    FORMAT(1H1)                                                       MK 00800
95    FORMAT(///////////)                                               MK 00810
96    FORMAT(////////)                                                  MK 00820
100   FORMAT(1H1/T56,'EVENT VECTOR LISTING'/)                           MK 00830
200   FORMAT(1H1/T51,'TARGETS OF OPPORTUNITY ENGAGED'//)                MK 00840
201   FORMAT(40F10.2)                                                   MK 00850
305   FORMAT(1H1/T46,'SCHEDULED AND PREPARATORY TARGETS ENGAGED'//)     MK 00860
401   FORMAT(1H1/T54,'REINFORCING UNIT TARGETS'//)                      MK 00870
1600  FORMAT(50F10.2)                                                   MK 00880
1613  FORMAT(5(10X,10F10.3/))                                           MK 00890
500   FORMAT(2X,'TARGET NUMBER',T40,F10.2/2X,'LOCATION',T40,F10.2,      MK 00900
     22X,'EAST',T60,F10.2,2X,'NORTH'/2X,'FO ERROR',T40,F10.2,2X,'EASTINGMK 00910
     2',T60,F10.2,'NORTHING'/2X,'TARGET CATEGORY',T40,F10.2/2X,'LATERAL MK 00920
     3LENGTH',T40,F10.2,2X,'METERS'/2X,'DEPTH',T40,F10.2,2X,            MK 00930
     4'METERS'/2X,'NUMBER OF TARGET ELEMENTS',T40,F10.2/2X,'TARGET DENSIMK 00940
     5TY',T40,F10.6/2X,'TIME GENERATED',T40,F10.2/2X,                   MK 00950
     7'UNIT BEING SUPPORTED',T40,F10.2/2X,'ADJUSTING UNIT',T40,         MK 00960
     8F10.2/2X,'INITIAL ENGAGEMENT RANGE',T40,F10.2,2X,'METERS'/        MK 00970
     92X,'NUMBER OF VOLLEYS IN ADJUSTMENT',T40,F10.2/2X,'STRATEGY USED IMK 00980
     2N FFE',T40,F10.2/2X, 'NUMBER OF VOLLEYS IN FFE',T40,F10.2/        MK 00990
     32X,'TOTAL ROUNDS FIRED ON TARGET',T40,F10.2/2X,'NUMBER OF CASUALTIMK 01000
     3ES INFLICTED',T40,F10.2/2X,'PERCENT CASUALTIES INFLICTED',T40,    MK 01010
     4F10.2/2X,'ROUNDS/CASUALTY',T40,F10.2/2X,'TOTAL ENGAGEMENT TIME',  MK 01020
     5T40,F10.2,2X,'SECONDS'/2X,'KILL RATE',T40,F10.3,2X,               MK 01030
     6'CASUALTIES/SECOND'///)                                           MK 01040
600   FORMAT(2X,'TARGET NUMBER',T40,F10.2/2X,'TARGET TYPE',T40,         MK 01050
     2F10.2,2X,'SCHD',T60,F10.2,'PREP'/2X,'UNIT ORIGINATING',T40,F10.2/ MK 01060
     32X,'TIME SCHEDULED',T40,F10.2/2X,'TIME FIRED',T40,F10.2/2X,       MK 01070
     3'UNIT FIRED',T40,F10.2/2X,'STRATEGY USED',T40,F10.2/2X,           MK 01080
     4'NUMBER OF VOLLEYS IN FFE',T40,F10.2/2X,'TOTAL ROUNDS FIRED',T40, MK 01090
     5F10.2/2X,'TOTAL TARGET ELEMENTS',T40,F10.2/2X,'TOTAL CASUALTIES INMK 01100
     6FLICTED',T40,F10.2/////)                                          MK 01110
700   FORMAT(2X,'TARGET NUMBER',T40,F10.2/2X,'TARGET TYPE',T40,F10.2,   MK 01120
     22X,'SCHD',T60,F10.2,2X,'PREP',T80,F10.2,2X,'TGT OPP'/ 2X,         MK 01130
     3'UNIT SCHEDULED TO FIRE',T40,F10.2/2X,'TIME SCHEDULED OR ORIGINATEMK 01140
     4D'T40,F10.2/2X,'TIME FIRED',T40,F10.2/2X,'TOTAL ENGAGEMENT TIME', MK 01150
     5T40,F10.2/////)                                                   MK 01160
800   FORMAT(1H1,T60,'SUMMARY DATA'///)                                 MK 01170
801   FORMAT(2X,'AVERAGE QUEUE LENGTH BY QUEUE'//T20,'1',T40,'2',T60,'3MK 01180
     2',T80,'4'//T16,F10.7,T36,F10.7,T56,F10.7,T76,F10.7//2X,'AVERAGE TIMK 01190
     3ME TARGET IN QUEUE(BY QUEUE)'//T20,'1',T40,'2',T60,'3',T80,'4'//  MK 01200
     4T16,F10.2,T36,F10.2,T56,F10.2,T76,F10.2//2X,'AVERAGE KILL RATE FORMK 01210
     5 A TARGET',T60,F10.7,2X,'CASUALTIES/SECOND OF ENGAGEMENT TIME'/   MK 01220
     22X,'OF OPPORTUNITY'///2X,'AVERAGE ROUNDS / CASUALTY FOR',T60,     MK 01230
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     3F10.6,2X,'ROUNDS / CASUALTY'/2X,'TARGET OF OPPORTUNITY'///)       MK 01240
      END                                                               MK 01250
      REAL FUNCTION DIST(A,B,C,D)                                       MK 01260
C                                                                       MK 01270
      DIST= SQRT((A-C)**2+(B-D)**2)                                     MK 01280
      RETURN                                                            MK 01290
      END                                                               MK 01300
      REAL FUNCTION RANGE(ET,SN,I)                                      MK 01310
C                                                                       MK 01320
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MK 01330
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MK 01340
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MK 01350
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MK 01360
     2XTLETH ,STAT(20,4)                                                MK 01370
C                                                                       MK 01380
      RANGE= SQRT((ET-ARDATA(I,7,7))**2+ (SN-ARDATA(I,7,8))**2)         MK 01390
      RETURN                                                            MK 01400
      END                                                               MK 01410


      SUBROUTINE WEVENT                                                 MK 01420
C                                                                       MK 01430
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MK 01440
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MK 01450
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MK 01460
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MK 01470
     2XTLETH ,STAT(20,4)                                                MK 01480
C                                                                       MK 01490
      WRITE(25,1275) (EVLIST(IROW,J),J=1,50)                            MK 01500
1275  FORMAT(50F10.2)                                                   MK 01510
      RETURN                                                            MK 01520
      END                                                               MK 01530


      SUBROUTINE FIOBJ(NUNIT,KRES)                                      MK 01540
C                                                                       MK 01550
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MK 01560
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MK 01570
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MK 01580
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MK 01590
     2XTLETH ,STAT(20,4)                                                MK 01600
C                                                                       MK 01610
      KRES=0                                                            MK 01620
      GO TO(100,100,100,100,200,200,1000),NUNIT                         MK 01630
100   IF(NUNIT .LE. 2) J=5                                              MK 01640
      IF(NUNIT .GT. 2) J=6                                              MK 01650
      IF(GDATA(NUNIT,20) .EQ. 1 .AND. GDATA(J,20) .EQ. 1) KRES=1        MK 01660
      GO TO 1000                                                        MK 01670
```

```
200   IF(GDATA(NUNIT,20) .EQ. 1) KRES=1                                 MK 01680
1000  RETURN                                                            MK 01690
      END                                                               MK 01700

      SUBROUTINE QUE(I)                                                 MK 01710
C                                                                       MK 01720
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MK 01730
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MK 01740
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MK 01750
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MK 01760
     2XTLETH ,STAT(20,4)                                                MK 01770
      DIMENSION PROF(3)                                                 MK 01780
C                                                                       MK 01790
      Q(I)= Q(I)+1                                                      MK 01800
      DO 1000 J=1,20                                                    MK 01810
      IF(QUES(I,J,50) .NE. 0) GO TO 1000                                MK 01820
      IJ=J                                                              MK 01830
      QUES(I,J,50)= 1.0                                                 MK 01840
      GO TO 1200                                                        MK 01850
1000  CONTINUE                                                          MK 01860
C                                                                       MK 01870
C     NO ROOM IN THE QUEUE                                              MK 01880
C                                                                       MK 01890
      CALL TERM(4,I)                                                    MK 01900
      STOP                                                              MK 01910
1200  DO 1250 J=1,50                                                    MK 01920
      QUES(I,IJ,J)= EVLIST(IROW,J)                                      MK 01930
1250  EVLIST(IROW,J)= 0.0                                               MK 01940
      RETURN                                                            MK 01950
      END                                                               MK 01960

      SUBROUTINE DQUE(J)                                                MK 01970
C                                                                       MK 01980
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         MK 01990
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  MK 02000
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   MK 02010
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   MK 02020
     2XTLETH ,STAT(20,4)                                                MK 02030
      DIMENSION PROF(3)                                                 MK 02040
C                                                                       MK 02050
      TMIN= 10.**6.                                                     MK 02060
      DO 100 K= 1,20                                                    MK 02070
      IF(QUES(J,K,1) .GT. TMIN) GO TO 100                               MK 02080
      IF(QUES(J,K,50) .EQ. 0) GO TO 100                                 MK 02090
      TMIN= QUES(J,K,1)                                                 MK 02100
      IS=K                                                              MK 02110
```

```
100     CONTINUE                                                              MK 02120
        STAT(J+4,1)= STAT(J+4,1) + CTIME - QUES(J,IS,1)                       MK 02130
        STAT(J+4,2)= STAT(J+4,2)+1                                            MK 02140
        CALL EARRAY(IX)                                                       MK 02150
        DO 200 I=1,50                                                         MK 02160
        EVLIST(IX,I)= QUES(J,IS,I)                                            MK 02170
        QUES(J,IS,I)= 0.0                                                     MK 02180
200     CONTINUE                                                              MK 02190
        EVLIST(IX,1)= CTIME+120                                               MK 02200
        EVLIST(IX,2)= 1.                                                      MK 02210
        Q(J)= Q(J)-1                                                          MK 02220
        RETURN                                                                MK 02230
        END                                                                   MK 02240


        SUBROUTINE CKQUE                                                      MK 02250
C                                                                             MK 02260
        COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,             MK 02270
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),        MK 02280
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                         MK 02290
        COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,       MK 02300
     2XTLETH ,STAT(20,4)                                                      MK 02310
C                                                                             MK 02320
        DO 100 J= 1,4                                                         MK 02330
        IF(Q(J) .EQ. 0) GO TO 100                                             MK 02340
        GO TO 200                                                             MK 02350
100     CONTINUE                                                              MK 02360
        GO TO 1000                                                            MK 02370
200     CALL DQUE(J)                                                          MK 02380
1000    DO 1100 J=1,50                                                        MK 02390
1100    EVLIST(IROW,J)= 0.0                                                   MK 02400
        RETURN                                                                MK 02410
        END                                                                   MK 02420


        SUBROUTINE SGAGE                                                      ML 00010
C                                                                             ML 00020
        COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,             ML 00030
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),        ML 00040
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                         ML 00050
        COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,       ML 00060
     2XTLETH ,STAT(20,4)                                                      ML 00070
C                                                                             ML 00080
        INT= EVLIST(IROW,4)                                                   ML 00090
        TGT(INT,37)= CTIME                                                    ML 00100
C                                                                             ML 00110
C       ENGAGE THE SUPPORTING UNIT                                            ML 00120
C                                                                             ML 00130
```

```
      SUP(1)= 1.0                                                       ML 00140
C                                                                       ML 00150
C     DETERMINE HOW LONG THE ENGAGEMENT WILL BE                         ML 00160
C                                                                       ML 00170
      IF(EVLIST(IROW,21) .EQ. 1) IS=11                                  ML 00180
      IF(EVLIST(IROW,21) .EQ. 4) IS=12                                  ML 00190
      IF(EVLIST(IROW,21) .EQ. 2) IS=13                                  ML 00200
      CALL TNGEN(PRDATA(2,4,IS,1),PRDATA(2,4,IS,2),PRDATA(2,4,IS,3),    ML 00210
     2PRDATA(2,4,IS,4),STME)                                            ML 00220
      TGT(INT,35)= STME                                                 ML 00230
C                                                                       ML 00240
C     SET UP THE DISENGAGEMENT                                          ML 00250
C                                                                       ML 00260
      CALL EARRAY(IX)                                                   ML 00270
      EVLIST(IX,1) = CTIME+STME                                         ML 00280
      EVLIST(IX,2)= 15.                                                 ML 00290
      IF(EVLIST(IROW,21) .GT. 1) EVLIST(IX,3)= 100.                     ML 00300
      IF(EVLIST(IROW,21) .EQ. 1) EVLIST(IX,3)= EVLIST(IROW,8)           ML 00310
      EVLIST(IROW,14)= CTIME+STME                                       ML 00320
      CALL WD300                                                        ML 00330
C                                                                       ML 00340
C     SET UP EVENT TO SEARCH THE QUEUES WHEN MISSION TERMINATED         ML 00350
C                                                                       ML 00360
      CALL EARRAY(IX)                                                   ML 00370
      EVLIST(IX,1)= CTIME+STME+60.                                      ML 00380
      EVLIST(IX,2)= 4.0                                                 ML 00390
      RETURN                                                            ML 00400
      END                                                               ML 00410


      SUBROUTINE CONV                                                   ML 00420
C                                                                       ML 00430
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         ML 00440
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  ML 00450
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   ML 00460
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   ML 00470
     2XTLETH ,STAT(20,4)                                                ML 00480
C                                                                       ML 00490
      K=0                                                               ML 00500
      DO 100 I=1,250                                                    ML 00510
      IF(TGT(I,6) .EQ. 0) GO TO 100                                     ML 00520
      IF((TGT(I,4)-GDATA(7,13)) .GT. 1000) GO TO 100                    ML 00530
      IF(TGT(I,4) .LT. GDATA(7,13)) GO TO 100                           ML 00540
      K=K+1                                                             ML 00550
  100 CONTINUE                                                          ML 00560
      IF(K .EQ. 0) GO TO 5000                                           ML 00570
      CALL UGEN(1.0,1.*K,S)                                             ML 00580
      IT=S                                                              ML 00590
```

```
      K=0                                                               ML 00600
      DO 200 I=1,250                                                    ML 00610
      IF(TGT(I,6) .EQ. 0) GO TO 200                                     ML 00620
      IF((TGT(I,4)-GDATA(7,13)) .GT. 1000) GO TO 200                    ML 00630
      K=K+1                                                             ML 00640
      IF(K .EQ. IT) GO TO 300                                           ML 00650
200   CONTINUE                                                          ML 00660
C                                                                       ML 00670
C     TARGET HAS BEEN IDENTIFIED                                        ML 00680
C                                                                       ML 00690
300   IST=I                                                             ML 00700
C                                                                       ML 00710
C     SEE IF TARGET WILL BE CLASSIFIED AS TARGET OF OPPORTUNITY         ML 00720
C     OR A SCHEDULED TARGET                                             ML 00730
C                                                                       ML 00740
      IF(TGT(IST,2) .GT. 4) GO TO 1000                                  ML 00750
      CALL UNIF(RNNR)                                                   ML 00760
      IF(RNNR .GE. .5) GO TO 1000                                       ML 00770
C                                                                       ML 00780
C     TARGET BECOMES A TARGET OF OPPORTUNITY                            ML 00790
C                                                                       ML 00800
      TGT(IST,6)=0.0
      TGT(IST,7)= 1.0                                                   ML 00810
      TGT(IST,9)=1.0
      CALL EARRAY(IX)                                                   ML 00820
      EVLIST(IX,1)= CTIME+10.                                           ML 00830
      EVLIST(IX,2)= 1.0                                                 ML 00840
      EVLIST(IX,3)= TGT(IST,1)                                          ML 00850
      EVLIST(IX,4)= 1.*IST                                              ML 00860
      TGT(IST,10)=CTIME                                                 ML 00870
      TGT(IST,20)= IX*1.                                                ML 00880
      CALL DARRAY(IA)                                                   ML 00890
      EVLIST(IX,5)= 1.*IA                                               ML 00900
      EVLIST(IX,6)= TGT(IST,3)                                          ML 00910
      EVLIST(IX,7)= TGT(IST,4)                                          ML 00920
      IF(TGT(IST,2) .GT. 4) GO TO 600                                   ML 00930
      EVLIST(IX,8)= TGT(IST,2)                                          ML 00940
600   CONTINUE                                                          ML 00950
      DO 1100 I=1,4                                                     ML 00960
      IF(TGT(IST,3) .GE. GDATA(I,3) .AND. TGT(IST,3) .LE. GDATA(I,5))   ML 00970
     2NUNIT=I                                                           ML 00980
1100  CONTINUE                                                          ML 00990
      EVLIST(IX,8)= 1.*NUNIT                                            ML 01000
1101  CONTINUE                                                          ML 01010
      TGT(IST,2)= 1.*NUNIT                                              ML 01020
      EVLIST(IX,17)= 1.0                                                ML 01030
      EVLIST(IX,19)= CTIME                                              ML 01040
      EVLIST(IX,21)= 1.0                                                ML 01050
```

```
      EVLIST(IX,36)= TGT(IST,3)
      EVLIST(IX,37)= TGT(IST,4)
      EVLIST(IX,41)= TGT(IST,3)
      EVLIST(IX,42)= TGT(IST,4)
C
C     COMPUTE THE ANGLE FROM THE FPC TO THE TARGET
C
      ARG= (TGT(IST,3)-GDATA(NUNIT,12))/(TGT(IST,4)-GDATA(NUNIT,13))
      EVLIST(IX,43)= ATAN(ARG)
      CALL DESTGT(IA,IST,IX)
      GDATA(NUNIT,16)= 1.0
      GDATA(NUNIT,18)= CTIME
      GO TO 5000
C
C     TARGET IS SCHEDULED
C
1000  CALL EARRAY(IX)
      TGT(IST,5)= 1.0
      TGT(IST,6)=0.0
      EVLIST(IX,1)= CTIME+60.
      EVLIST(IX,2)= 1.
      EVLIST(IX,3)= TGT(IST,1)
      EVLIST(IX,4)= 1.*IST
      EVLIST(IX,6)= TGT(IST,3)
      EVLIST(IX,7)= TGT(IST,4)
      EVLIST(IX,8)= TGT(IST,2)
      IF(TGT(IST,2) .EQ. 5) EVLIST(IX,9)=1.0
      IF(TGT(IST,2) .EQ. 6) EVLIST(IX,9)= 3.0
      IF(TGT(IST,2) .EQ. 7) EVLIST(IX,9)=2.0
      EVLIST(IX,16)= 1.0
      EVLIST(IX,17)= 1.0
      EVLIST(IX,21)= 4.0
      EVLIST(IX,32)= TGT(IST,3)
      EVLIST(IX,33)= TGT(IST,4)
      EVLIST(IX,36)= TGT(IST,3)
      EVLIST(IX,37)= TGT(IST,4)
      TGT(IST,10)= CTIME
      TGT(IST,20)= IX*1.
C
C     SET UP THE NEXT TARGET
C
5000  CALL EXPON(XTME)
      EVLIST(IROW,1)= CTIME+XTME
      RETURN
      END
```

```
      SUBROUTINE ASTAT                                                  ML 01500
C                                                                       ML 01510
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         ML 01520
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  ML 01530
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   ML 01540
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   ML 01550
     2XTLETH ,STAT(20,4)                                                ML 01560
C                                                                       ML 01570
      DO 100 J=1,4                                                      ML 01580
      STAT(J,1)= STAT(J,1)+Q(J)                                         ML 01590
100   STAT(J,2)= STAT(J,2)+1                                            ML 01600
      EVLIST(IROW,1)= CTIME+10.                                         ML 01610
      RETURN                                                            ML 01620
      END                                                               ML 01630


      SUBROUTINE TERM(I,K)                                              ML 01640
C                                                                       ML 01650
      COMMON NU,PRDATA(3,7,20,10),GDATA(7,20),TGT(250,40),ITGT,         ML 01660
     2EVLIST(250,50),ARDATA(4,7,16),IROW,TDES(10,300,4),FD105(4,50,3),  ML 01670
     3CEVENT(50),J100,J200,CTIME,TINC,TOPT,SHOUR,EXMN                   ML 01680
      COMMON SUP(10),RMAX,NGUNS,Q(4),QUES(4,20,50),NCHGS,NRINC,XLETH,   ML 01690
     2XTLETH ,STAT(20,4)                                                ML 01700
C                                                                       ML 01710
      SUP(3)=1.0                                                        ML 01720
      WRITE(6,99)                                                       ML 01730
      GO TO (100,200,300,500),I                                         ML 01740
100   WRITE(6,101)                                                      ML 01750
      GO TO 400                                                         ML 01760
200   WRITE(6,202)                                                      ML 01770
      GO TO 400                                                         ML 01780
300   WRITE(6,303)                                                      ML 01790
      GO TO 400                                                         ML 01800
500   WRITE(6,404) K                                                    ML 01810
      WRITE(6,405)                                                      ML 01820
400   CALL SUMRY                                                        ML 01830
      RETURN                                                            ML 01840
99    FORMAT(2X,'FINAL OBJECTIVE NOT SECURED')                          ML 01850
101   FORMAT(2X,'EVLIST IN OVERFLOW CONDITION')                         ML 01860
202   FORMAT(2X,'TARGET HISTORY ARRAY IN OVERFLOW CONDITION')           ML 01870
303   FORMAT(2X,'TARGET DESCRIPTION ARRAY IN OVERFLOW CONDITION')       ML 01880
404   FORMAT(2X,'QUEUE',2X,I1,1X,'IS IN OVERFLOW CONDITION')            ML 01890
405   FORMAT(/////)                                                     ML 01900
      END                                                               ML 01910
```

JOB CONTROL SECTION

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29 December 1970

Major Lowell L. Martin (71193), US Army
HHC 4th Infantry Division (WAJZAA)
APO, San Francisco 96262

Dear Major Martin:

In a review of your thesis, it was discovered that either page 224 is missing or page 225 and on through page 230 are misnumbered. Your advisor, Professor Taylor, tells me that the master copy reflects the same condition and that he is unable to reconcile.

Since it is very likely that you do not have a copy of your thesis with you at your present duty station, I am enclosing a copy of pages 223 and 225. All material from page 226 on consists of references, distribution list, etc., and does not, therefore, bear on the question. Can you, from the enclosures, enlighten me?

Sincerely

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P. 224

```
//GO.FT06F001 DD SPACE=(CYL,20)
//GO.SYSUDUMP DD SYSOUT=A,SPACE=(CYL,(8,1))
//GO.FT10F001 DD UNIT=SYSDA,DISP=(NEW,DELETE),DSN=&TEMP1,
//   SPACE=(CYL,5),DCB=(RECFM=FB,LRECL=400,BLKSIZE=4000)
//GO.FT20F001 DD UNIT=SYSDA,DISP=(NEW,DELETE),DSN=&TEMP2,
//   SPACE=(CYL,5),DCB=(RECFM=FB,LRECL=400,BLKSIZE=4000)
//GO.FT25F001 DD UNIT=SYSDA,DISP=(NEW,DELETE),DSN=&TEMP3,
//  SPACE=(CYL,10),DCB=(RECFM=FB,LRECL=500,BLKSIZE=2500)
//GO.FT30F001 DD UNIT=SYSDA,DISP=(NEW,DELETE),DSN=&TEMP4,
//   SPACE=(CYL,5),DCB=(RECFM=FB,LRECL=400,BLKSIZE=4000)
//GO.FT40F001 DD UNIT=SYSDA,DISP=(NEW,DELETE),DSN=&TEMP4,
//   SPACE=(CYL,5),DCB=(RECFM=FB,LRECL=400,BLKSIZE=4000)
//GO.SYSIN DD *
```

LIST OF REFERENCES

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ABSTRACT

A probablistic event store computer simulation of the artillery direct fire support system at brigade level is presented. The prupose of the model is to serve as a tool in evaluating changes in artillery fire support system effectiveness as system and battlefield parameters are varied. Parameters which are variable in the model pertain to the geometric configuration of the battlefield, artillery weapon employment configurations, artillery weapon ballistic parameters, weapon lethality, target configuration and vulnerability, artillery system time parameters, weapon position accuracy parameters, and target location accuracy parameters. A description of the model and a FORTRAN IV program listing are provided.

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